

**Chevron Environmental Management
Company**

Chevron Site No. 354972

**Sub-Slab Soil Vapor Investigation
Report**

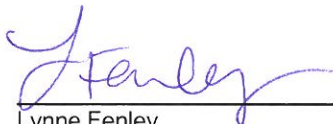
5528 NW Doane Ave.
Portland, Oregon
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ARCADIS



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**Sub-Slab Soil Vapor
Investigation Report**

5528 NW Doane Ave.
Portland, Oregon

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Acronyms and Abbreviations

%	Percent
Air Toxics	Eurofins Air Toxics, Ltd.
Alluvium	Quaternary alluvial deposits
Annex	Lubricants Warehouse
ARCADIS	ARCADIS U.S., Inc.
Basalt	Miocene/Pliocene Columbia River Basalt Group lava flows
bgs	below ground surface
BTEX	Benzene, Toluene, Ethylbenzene, m,p-Xylene, and o-Xylene
DEQ	Oregon Department of Environmental Quality
ECSI	Environmental Cleanup Site Information
EMC	Environmental Management Company
Fill	Quaternary fill
inHg	inches of mercury
KHM	KHM Environmental Management
ml	milliliter
ml/min	milliliters per minute
OUNC	Oregon Utility Notification Center
Phillips Terminal	Phillips 66 Portland Terminal
RBC	Risk Based Concentration
Report	Sub-Slab Soil Vapor Investigation Report
Respondents	Chevron U.S.A. Inc. Products Company, Shell Oil Company, and Union Oil Company of California
RI	Remedial Investigation
RL	Laboratory Reporting Limit
site	Phillips 66 Portland Terminal, Chevron Site No. 354972

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SOP	Standard Operating Procedure
TPH	total petroleum hydrocarbons
TPH-d	total petroleum hydrocarbons in the diesel range
TPH-g	total petroleum hydrocarbons in the gasoline range
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WTG	Willbridge Terminal Group



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1. Introduction

On behalf of Chevron Environmental Management Company (EMC), ARCADIS U.S., Inc. (ARCADIS) is pleased to submit this Sub-Slab Soil Vapor Investigation Report (Report) for the Phillips 66 Portland Terminal, Chevron Site No. 354972 (Phillips Terminal), located at 5528 NW Doane Avenue, in Portland, Oregon (site; Figure 1). Site investigation activities were completed in general accordance with ARCADIS' August 2014 *Sub-Slab Soil Vapor Investigation Work Plan* (ARCADIS 2014a). This Report includes an evaluation of potential risks due to commercial/industrial worker inhalation of volatile constituents, which may migrate from subsurface into the indoor air of currently occupied onsite buildings and documents a sub-slab soil vapor investigation conducted at the site. The site is listed in Oregon Department of Environmental Quality (DEQ) Environmental Cleanup Site Information (ECSI) database (ID No. 177).

This Report is structured as follows:

- Section 2 – describes the site conditions, environmental history, and regulatory framework.
- Section 3 – summarizes the methods and results of the 2014 soil vapor migration screening evaluation.
- Section 4 – presents methods used during the sub-slab soil vapor investigation.
- Section 5 – summarizes results of sub-slab soil vapor investigation and provides a vapor migration screening level risk evaluation.
- Section 6 – presents conclusions and recommendations.

2. Site Description and Environmental History

The site is located in Township 1 North, Range 1 East, Section 18 (Southwest quarter) in the northwestern portion of the Guilds Lake Industrial District. The land use near the site is industrial and commercial. The site is bounded to the northwest by the Chevron Willbridge Terminal, to the southwest by Burlington Northern Railroad tracks, to the northeast by the Willamette River, and to the southeast by the Arc Terminal.

2.1 Site History and Features

The site consists of the Phillips 66 Main Terminal and the Phillips 66 Terminal Dock Area. The Phillips Terminal has been in operation since 1908. From 1968 to 1975, the terminal produced asphalt. The terminal currently stores and distributes a variety of refined petroleum products, including light petroleum products and lubricating oils (ARCADIS 2011). There are no current plans to re-develop the site. A site plan is presented in Figure 2.

2.2 Geology and Hydrogeology

Site geology and hydrogeology have been investigated through various subsurface investigation programs at the site dating back to approximately 1982, including those presented in the Final Upland Remedial Investigation Report (KHM Environmental Management [KHM] 2003). Site geology consists of three general units:

- Quaternary fill (fill) – generally comprises Willamette River dredge spoils used to reclaim land from Doane Lake and from the Willamette River shoreline.
- Quaternary alluvial deposits (alluvium) – flood plain and channel deposits from Willamette River and/or Lake Missoula flood deposits.
- Miocene/Pliocene Columbia River Basalt Group lava flows (basalt).

The fill consists of fine- to medium-grained sand and silty sand. The alluvium consists of clayey silt with sand and organics, and commonly occurs with inter-bedded silty clay and clay layers. Together, these units are up to 50 feet thick and thin out toward the Willamette River. The alluvium overlies basalt, which regionally is documented to be moderately to intensely weathered, competent, fractured, or brecciated, and vesicular to massive.

Site hydrogeology is characterized by three water-bearing zones:

- Shallow water-bearing zone
- Intermediate water-bearing zone
- Deep water-bearing zone.

The water table is generally encountered in the shallow water-bearing zone between 2.5 and 22 feet below ground surface (bgs). The shallow water-bearing zone is



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comprised of fill material. The intermediate and deep water-bearing zones are interpreted as semi-confined water-bearing zones, comprising alluvium overlying the basalt. Discontinuous low-permeability zones have been documented within the intermediate and deep water-bearing zones. Monitoring wells at the site are variably screened in the shallow, intermediate, and deep water-bearing zones (ARCADIS 2011). Seasonal variation in groundwater elevation is typical at the site. In general, the water table is elevated in fourth and first quarters. Groundwater data in the western area of the site are limited. However, groundwater depths in site wells closest to this area of the site (U-5A and U-18) typically range between approximately 5.1 and 11.0 feet bgs and groundwater depth in well U-14, located in the vicinity of the maintenance building, typically ranges between 11.3 and 15.2 feet bgs (ARCADIS 2014b).

3. Regulatory Framework

In April 1994, the DEQ issued a Consent Order (WMCSR-NWR-94-06 dated April 6, 1994; DEQ 1994) pursuant to Oregon Revised Statute 465.260(4) to Chevron U.S.A. Inc. Products Company, Shell Oil Company, and Union Oil Company of California (the Respondents [the owners of the subject properties in 1994]), collectively. In the Consent Order (DEQ 1994), the DEQ required that remedial investigation (RI)/feasibility study (OAR 340-122-080) be performed, which included implementing an interim action plan and site characterization. The combined site (the Respondents' sites) is listed in the ECSI database as the Willbridge Bulk Fuel Area, Site ID #1549. The Willbridge Terminal Group (WTG) comprises the current owners (Chevron U.S.A. Inc., Kinder Morgan, and Phillips 66) of the Willbridge Bulk Fuel Area.

As part of the Consent Order, the WTG submitted a RI Report (KHM 2003) and an addendum to the RI (Delta 2005). The RI report did not include an evaluation of the potential for petroleum hydrocarbon constituent vapor migration from the subsurface into occupied buildings located across the site. In approximately 2011, DEQ verbally requested that the WTG evaluate potential human health risks due to possible migration of petroleum hydrocarbon vapors from the subsurface.

3.1 Relevant Historical Releases

Releases from the period between 1979 through the present have been documented at the site. The majority of these releases have occurred inside the tank yard areas. Released product consists of fuel, oil, and fuel additives. The approximate locations of historical releases are shown on Figure 3 and described in Table 1.

4. Soil Vapor Migration Screening Evaluation

In late 2013, ARCADIS completed a vapor migration screening evaluation to assess potential vapor exposure risks and to identify whether additional investigation would be required to evaluate potential human health risks associated with subsurface vapor migration. The methods and results of this evaluation are summarized below and were presented to DEQ on May 14, 2014. A slide deck of the presentation provided to DEQ is included in Appendix A.

4.1 Potential Receptors and Exposure Pathways for Vapor

To focus on areas of the site with the greatest potential for vapor migration exposures to occupational workers, ARCADIS identified the onsite buildings which were occupied by potential receptors. ARCADIS defined occupied buildings as having an average of eight or more hours of occupancy per workday with at least one full-time employee. Buildings that are used temporarily, are not occupied by full-time workers (e.g., process rooms, storage units, etc.), or have two stories with separate ventilation systems are not expected to have conditions that would pose significant risks to indoor commercial/industrial workers from vapor migration. Occupied buildings were identified based on information collected during a site visit and interview with Phillips Terminal personnel conducted on July 17, 2013. The four site buildings that meet the definition of an occupied building are indicated on the site plan shown on Figure 3, and include the Maintenance Building, Lubricants Building, Boiler Room/Quality Control Laboratory, and Lubricants Warehouse.

4.2 Historical Releases Located Near Occupied Buildings

To evaluate possible vapor migration risk in buildings near areas of potentially impacted soil, ARCADIS compared the location of known historical releases in relation to occupied buildings. Approximate locations of known historical releases are presented in Figure 3 and described in Table 1. One release was found to have occurred within 100 feet of the Maintenance Building and one release was found to have occurred within 100 feet of the Lubricants Warehouse.

4.3 Evaluation of Vapor Risk from Soil Impacts

In an electronic message dated May 23, 2014, the DEQ requested that ARCADIS compare historical soil data presented in the RI Report (KHM 2003) with current DEQ risk-based concentrations (RBCs) for the volatilization to outdoor air and vapor

migration into buildings exposure pathways to assess potential vapor exposure risk in areas with petroleum hydrocarbon impacted soil. As requested by the DEQ, ARCADIS compared the historical soil analytical data collected in 1998 and presented in the RI Report (KHM 2003) with the applicable soil occupational RBCs. Soil boring locations and a summary of soil analytical data from the 1998 investigation are presented in Appendix B. Table 2 presents a comparison of historical soil data and DEQ (2012) soil Occupational Volatilization to Outdoor Air and Vapor Intrusion into Buildings RBCs. Concentrations of volatile constituents detected in soil samples collected at the site in 1998 do not exceed the current applicable RBCs.

4.4 Evaluation of Vapor Risk from Groundwater Impacts

Petroleum hydrocarbon constituents in groundwater may volatilize into soil vapor, which can then migrate to outdoor air or indoor air of overlying buildings and be inhaled by potential receptors. To assess the potential vapor exposure risk in areas with groundwater impacts, ARCADIS reviewed historical groundwater data collected at the Phillips Terminal between 2000 and present. Volatile organic compound (VOC) data from these wells were screened against DEQ occupational groundwater RBCs for volatilization to outdoor air and vapor intrusion into buildings exposure pathways. Table 3 presents a comparison of historical groundwater analytical data and the applicable groundwater occupational RBCs. Figure 3 shows the locations of site monitoring wells. A review of the groundwater analytical data indicates that concentrations of petroleum-related compounds in samples collected at the site since 2000 do not exceed DEQ (2012) groundwater Occupational Volatilization to Outdoor Air and Vapor Intrusion into Buildings RBCs. A limited amount of groundwater data have been collected in areas within 100 feet of occupied buildings. Existing groundwater data are insufficient to evaluate potential vapor migration risk to commercial/industrial workers in currently occupied onsite buildings. Thus, as described in Section 5, sub-slab soil vapor samples were collected to evaluate these possible exposures.

5. Sub-Slab Sampling Field Activities

This section presents site investigation activities associated with the installation and sampling of eight permanent sub-slab soil vapor probes in four occupied buildings located on site; as described in Section 4.1. Sub-slab soil vapor sampling activities were conducted in accordance with DEQ's *Guidance for Assessing and Remediating Vapor Intrusion in Buildings* (DEQ 2010). The purpose of this investigation was to address data gaps identified during the vapor migration screening evaluation, summarized in Section 4 of this Report. ARCADIS collected sub-slab soil vapor data

beneath occupied buildings to evaluate potential vapor migration risk to on-site occupational receptors.

5.1 Sub-Slab Soil Vapor Probe Installation

Prior to subsurface activities, the Oregon Utility Notification Center (OUNC) was notified of intent to advance the subsurface probes. Locates Down Under of Oregon City, Oregon, surveyed for underground utilities inside and around buildings where proposed probes were located using a ground penetrating radar and electromagnetic scanner under supervision by ARCADIS personnel. Terminal operations and maintenance personnel were interviewed to verify information collected from the OUNC survey and the private utility locating survey.

On December 3, 2014, ARCADIS installed eight sub-slab soil vapor probes (SSVP-1 through SSVP-8). Two sub-slab soil vapor probes (SSVP-1 and SSVP-2) were installed in the shop area located in the approximately 6,000-square foot Maintenance Building. Four vapor probes (SSVP-3 through SSVP-6) were installed inside the Lubricants Building, an approximately 46,000-square foot office/warehouse building. Sub-slab soil vapor probe SSVP-7 was installed in the 500-square foot Quality Control Laboratory within the 3,900-square foot steam plant/boiler room building. At the request of DEQ, sub-slab vapor probe SSVP-8 was installed in the approximately 9,000-square foot Lubricants Warehouse to evaluate vapor migration risks in the event the structure is used in the future by occupational workers for extended time periods. The locations of the sub-slab soil vapor probes are indicated on Figure 4.

Sub-slab soil vapor probes were installed following the recommended procedures outlined in the *Draft Standard Operating Procedures (SOP) for Installation of Sub-Slab Vapor Probes and Sampling Using EPA Method TO-15 to Support Vapor Intrusion Investigations* (USEPA 2006). A rotary hammer drill, fitted with a 1-inch diameter drill bit was used to drill approximately 1-inch into the slab. A second 0.3125-inch diameter hole was then drilled in the center of the existing hole. The 0.3125-inch diameter hole was advanced through the thickness of the slab and approximately 3-inches into the sub-slab fill material.

Following borehole completion, sub-slab soil vapor probes were constructed and installed in each borehole. Sub-slab probes were constructed by fitting stainless-steel compression fittings to 0.25-inch outer diameter chromatography grade 316 stainless-steel tubing. The length of stainless steel tubing was selected based on the thickness of the slab to avoid obstruction of the probe with sub-slab material. The probes were

wrapped with polytetrafluoroethylene tape to create a seal around the assembly and borehole. Hydrated quick-drying Portland cement was used to mount the vapor-tight probe cap at the ground surface. The cement was allowed to cure for at least 24 hours prior to sampling. A diagram indicating sub-slab soil vapor probe construction details is presented in Figure 5. Due to the introduction of atmospheric oxygen into the subsurface during soil vapor probe installation, the sub-slab vapors were allowed a minimum of 24 hours to equilibrate with the subsurface before sampling.

5.2 Soil Vapor Probe Sample Collection

On December 4 and 5, 2014, ARCADIS collected sub-slab soil vapor samples from probe locations SSVP-1 through SSVP-7 following the recommended procedures described in ARCADIS' SOP for *Soil-Gas Sampling and Analysis Using USEPA Method TO-17 and TO-15* (Appendix C). ARCADIS was unable to collect samples from probe location SSVP-8 in the Lubricants Warehouse due to a lack of extractable vapors under an applied vacuum. A blind duplicate vapor sample (BD-1) was collected in line with SSVP-2 and an equipment blank sample (EB-1) was collected using a laboratory-supplied air source.

ARCADIS field staff conducted a shut-in leak test prior to sampling the soil vapor probes to ensure the integrity of the sampling system. One vapor-tight two-way ball valve was installed closest to the soil vapor port (port valve) and another vapor-tight two-way ball valve was installed on the opposite end of the sampling train (purge valve). While the port valve was left in the closed position, a laboratory-provided syringe was used to remove approximately 25 milliliters (ml) from the purge port, to induce a vacuum of approximately 5 inches of mercury ([inHg] approximately 68 inches of water) within the sampling train. The purge valve was then closed and the vacuum within the sampling train was monitored for a minimum of 2 minutes. If there was any observable loss in the vacuum within the sampling train after 2 minutes, fittings were adjusted and the test was repeated until the vacuum in the sampling train did not dissipate.

Following the shut-in leak test, ARCADIS conducted a passive leak test at each soil vapor probe location prior to sample collection. The sub-slab soil vapor probe and entire sampling train (valves, tubing, gauges, manifold and sample canister) were placed in an enclosure and a tracer compound of high-purity helium was permitted into the enclosure. During the test, a helium concentration of approximately 10 to 15 percent (%) by volume was maintained within the enclosure and monitored using a portable helium detector. Prior to collecting the soil vapor sample, approximately 300



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ml was purged from the sub-slab soil vapor probe at a flow rate of less than or equal to 100 milliliter per minute (ml/min). Purged soil vapor was screened in the field with a portable helium detector for the tracer compound to ensure samples were representative of sub-surface conditions. The helium tracer was not detected in the purged effluent from the sub-slab soil vapor probes.

Sub-slab vapor samples were then collected using 1-Liter 100% certified passivated sampling canisters at a flow rate of less than or equal to 100 ml/min. A vacuum of less than 10 inHg was maintained throughout sampling. Sub-slab soil vapor sampling was stopped when the canister vacuum dropped to no less than 5 inHg and a helium concentration of approximately 10 to 15% was maintained throughout the sampling interval. Upon completion of passivated canister sampling, laboratory provided, pre-packed sorbent tubes were connected to the sample port and samples were collected with a new disposable syringe fitted with a three way valve. Two sorbent tubes with different sample volumes (30 ml and 100 ml) were collected from each sample location. Multiple sample volumes were collected to ensure laboratory dilution did not elevate reporting limits above RBCs. Following collection of the sorbent tubes, a landfill gas meter was connected to the sample port and purged vapor was field screened for flammability, oxygen, and carbon dioxide. Sub-slab soil vapor sample collection logs are included in Appendix D.

Sub-slab vapor samples were shipped under chain-of custody protocols to Eurofins Air Toxics, Ltd. (Air Toxics) located in Folsom, California for the following analysis:

- Full-suite VOCs and total petroleum hydrocarbons (TPH) in the gasoline range (TPH-g) by modified USEPA Method TO-15
- TPH in the diesel range (TPH-d) by modified USEPA Method TO-17.

To assess sample train integrity and to collect additional data that can be used to evaluate biodegradation of petroleum impacts, sub-slab soil vapor samples were also analyzed for:

- Fixed gases, including oxygen, carbon dioxide, methane, and helium by Modified ASTM Method D-1946.



5.3 Waste Management

Waste generated during the site investigation included concrete dust, personal protective equipment, and other disposable sampling and field equipment. Waste was placed in heavyweight garbage bags and disposed of as municipal waste.

6. Investigation Results

Sub-slab soil vapor results from SSVP-1 through SSVP-7 are discussed in the following sections. The discussion includes an assessment of the quality assurance/quality control procedures applied to the data and a comparison of detected concentration to applicable DEQ soil gas RBCs

6.1 Quality Assurance/Quality Control Analytical Results

The following quality assurance and quality control methods were used to evaluate soil vapor data validity and usability. These methods include:

- Blind duplicate and equipment blank sample collection
- Helium tracer testing
- Evaluation of oxygen levels

6.1.1 Evaluation of Blind Duplicate and Equipment Blank Samples

During the sub-slab soil vapor investigation a blind duplicate vapor samples (BD-1) were collected from SSVP-2 and an equipment blank sample (EB-1) was collected using a laboratory-supplied air source. Laboratory analytical data results for these samples are presented in Appendix E. VOC, TPH-g, and TPH-d concentrations are summarized in Table 4. Fixed gases concentrations are summarized in Table 5.

The BD-1 canister sample was collected in-line with its respective parent sample at SSVP-2. Sorbent tube duplicate samples were collected sequentially to limit preferential flow in the sampling system. A comparison of the analytical results for BD-1 and SSVP-2 indicate that the sample quality is acceptable. In general, analytical results from sample BD-1 were consistent with the results from the parent sample collected from SSVP-2. However, 2-Propanol was detected in sample SSVP-2 at 46 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) and was not detected in sample BD-1. The



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discrepancy is not considered significant given the relatively low detection, the magnitude of the 2-propanol RL, and the lack of detected VOCs in the both the parent and duplicate samples.

EB-1 was collected using a laboratory-supplied nitrogen gas. Concentrations of VOC, TPH-g, and TPH-d in EB-1 were below laboratory method reporting limits, which indicates that the data are acceptable. The oxygen concentration in EB-1 was measured above the laboratory method reporting limit (0.63 %). This indicates that outdoor air leakage into the sampling train was negligible, and that the data are acceptable.

6.1.2 Evaluation of Helium Tracer Test

Helium tracer gas was maintained at a concentration of 10 to 15% inside the sampling enclosure though out sampling to assess leakage. Helium was not detected above the laboratory reporting limit in analyzed samples indicating sample train integrity was maintained throughout sampling. As such, the samples are representative of sub-slab vapor and do not contain contributions from ambient indoor air. Laboratory analytical data results for fixed gases in soil gas are included in Appendix E, and are summarized in Table 5.

6.1.3 Evaluation of oxygen levels

The concentration of oxygen in outdoor air is approximately 20.9%. Sub-slab soil vapor typically has lower oxygen concentrations than outdoor air, particularly directly beneath the center of the slab. Oxygen concentrations in vapor samples can be used to evaluate the leakage of outdoor ambient air into the vapor sample. The concentrations of oxygen in the sub-slab soil samples ranged from 13 to 20% and are consistent with expected levels in sub-slab vapor. Thus, this measure indicates the data are acceptable.

6.2 Sub-Slab Soil Vapor Analytical Results

TPH-g and TPH-d were not detected in analyzed samples. Several VOCs, including ethanol, acetone, toluene, and 2-propanol, were detected at low concentrations in the sub-slab soil vapor samples. Ethanol was detected at concentrations above the laboratory method reporting limit at concentrations ranging from $13 \mu\text{g}/\text{m}^3$ (SSVP-3) to $29 \mu\text{g}/\text{m}^3$ (SSVP-4). The five locations that contained ethanol included each of the samples collected from below the lubricant buildings and the sample collected from the



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QC lab. Acetone was detected at concentrations above the laboratory method reporting limit at four locations at concentrations ranging from 30 $\mu\text{g}/\text{m}^3$ (SSVP-7) to 54 $\mu\text{g}/\text{m}^3$ (SSVP-3). 2-Propanol was detected at SSVP-2 at 46 $\mu\text{g}/\text{m}^3$. Toluene was detected at concentrations above the laboratory method reporting limit at two locations at concentrations ranging from 5.2 $\mu\text{g}/\text{m}^3$ (SSVP-5) to 10 $\mu\text{g}/\text{m}^3$ (SSVP-6). Laboratory analytical results are included in Appendix E and are summarized in Table 4.

6.3 Comparison of Sub-Slab Vapor Results to RBCs

Soil vapor analytical results collected in December 2014 from sub-slab soil vapor probes SSVP-1 through SSVP-7 were compared to DEQ's occupational RBCs for the vapor intrusion into buildings (VI) exposure pathway. Out of the four detected VOCs, the DEQ has established one applicable soil gas RBC (toluene). None of the detected toluene concentrations exceed VI RBCs and the detections are more than six magnitudes below the soil gas occupational VI RBC.

7. Conclusion and Recommendations

This report presents an evaluation of potential vapor migration risk at the site based on the locations of past releases, groundwater data collected since 2000, soil analytical data collected in 1998, and sub-slab soil vapor data collected in 2014. The vapor investigation was initiated at the request of DEQ to evaluate human health risks due to potential migration of petroleum hydrocarbon vapors from the subsurface into occupied site buildings.

Due to a lack of available soil and groundwater data in areas proximal to occupied site buildings, ARCADIS installed eight sub-slab vapor probes across the site to collect and evaluate soil vapor conditions below several site building's concrete foundations. Seven of the probe locations were analyzed and soil vapor data collected from the probes indicate that petroleum-related constituents in soil vapor are not present or are below applicable DEQ Vapor Intrusion into Buildings RBCs.

One of the probes (SSVP-8) could not be sampled. SSVP-8 is located in the Lubricants Warehouse in the southernmost area of the site. The concrete slab thickness in the annex was found to be approximately 12-inches thick during probe installation. Interviews with Phillips Terminal staff during the probe installation revealed additional information regarding the Lubricants Warehouse's construction. According to Phillips Terminal staff, the Lubricants Warehouse's concrete slab foundation was designed for maximum live loading allowing for the bulk storage of drums of petroleum-based



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lubricants. The slab design included a sub-slab base layer compacted with rollers to 100% compaction, a 12-inch thick high strength concrete slab, a 0.25-inch cap of high strength concrete infused with steel shavings to reduce surface wear from forklift traffic. ARCADIS attributes inability to induce a vacuum in SSVP-8 to the degree of compaction in the sub-slab material. However, given the density and thickness of the concrete slab and degree of compaction of the building's sub-slab material in conjunction minimal VOC detections at probe locations SSVP-1 through SSVP-7, potential petroleum-related vapors in soil gas impacting the Lubricants Warehouse's indoor air quality is not likely.

The results of this evaluation indicate that concentrations of petroleum hydrocarbon constituents in sub-slab soil vapor are not expected to pose adverse health effects to commercial/industrial workers in onsite occupied buildings. In buildings where the potential for vapor migration from subsurface may exist, petroleum hydrocarbon constituent sub-slab soil vapor concentrations do not exceed applicable DEQ soil gas RBCs. Thus, additional site investigation to evaluate this potential exposure pathway is not recommended at this time.



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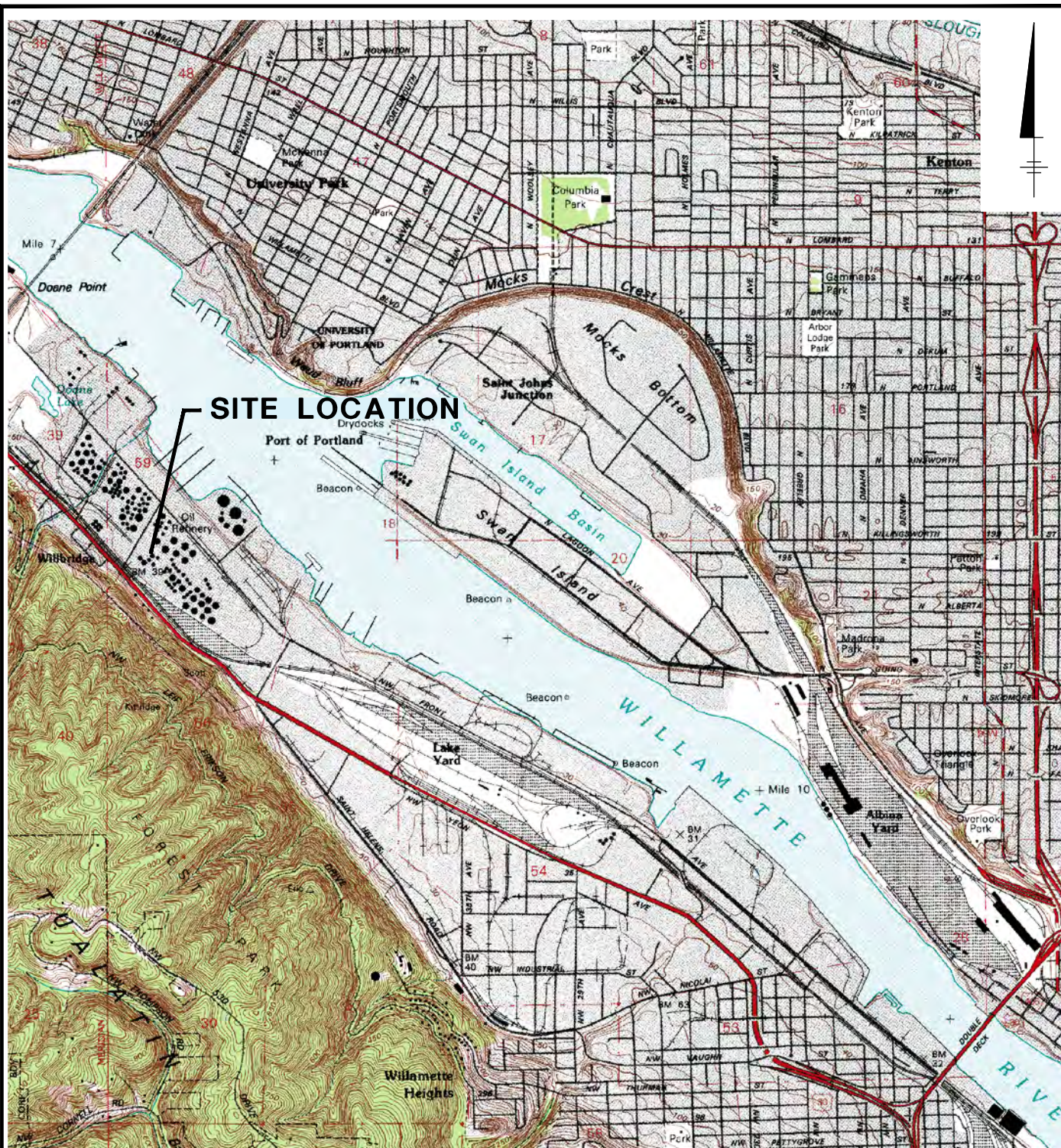
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Figures

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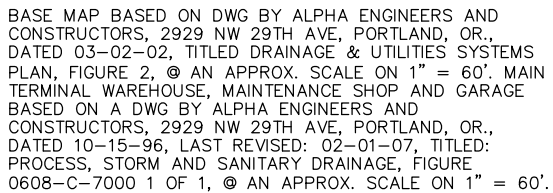
QUADRANGLE LOCATION

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
5528 NW DOANE AVE., PORTLAND, OREGON
**SUB-SLAB SOIL VAPOR
INVESTIGATION REPORT**

SITE LOCATION MAP



FIGURE
1



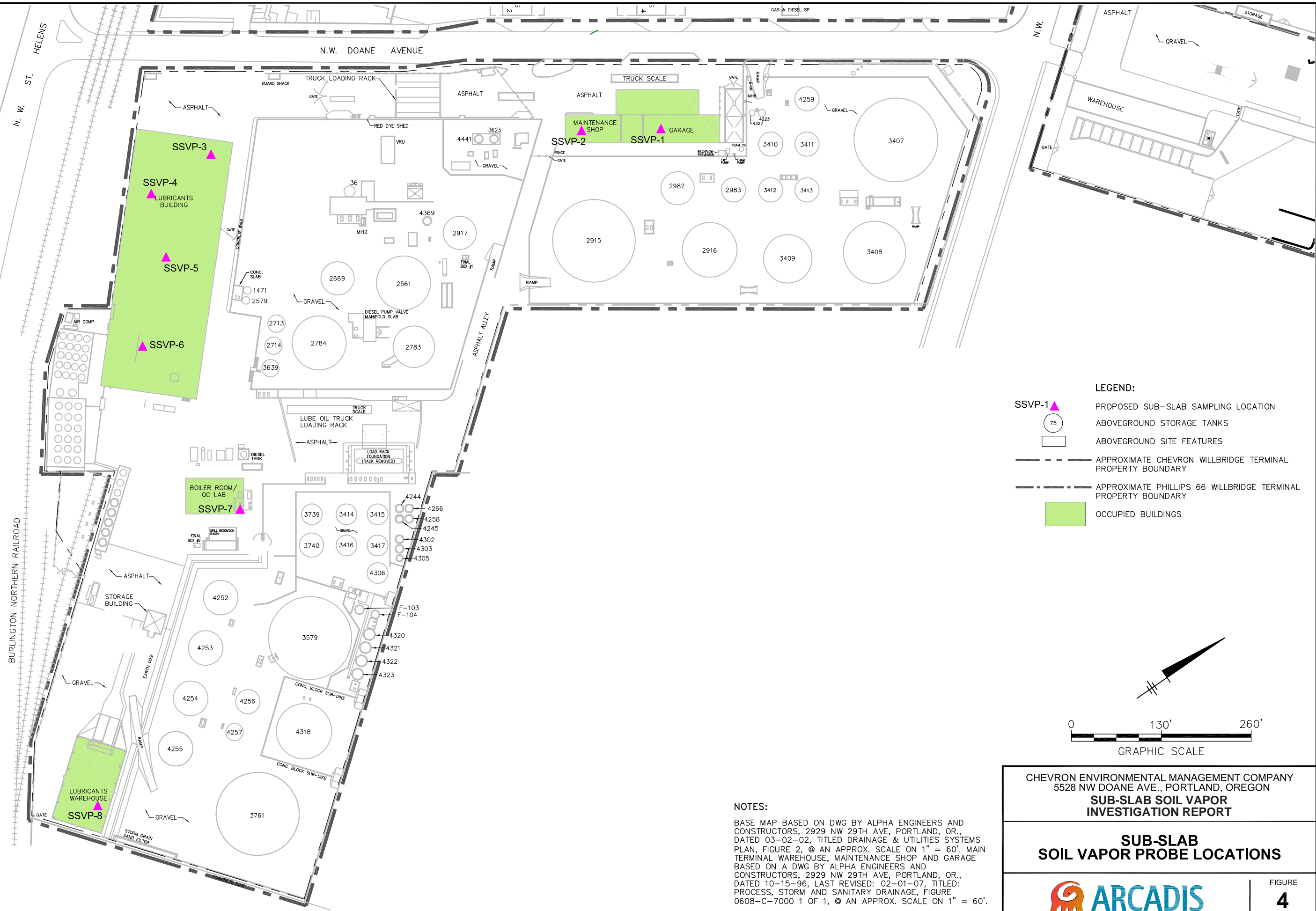
— — — — — APPROXIMATE PHILLIPS 66 WILLBRIDGE TERMINAL
PROPERTY BOUNDARY

2

CITY: (CARY, NC) SYRACUSE, NY DIV/GROUP: ENV/IM+DV DB: (L, ELIUS) R, PETRIE, R, ALLEN PM/TM: G, SPRICK TR: E, SHORT LYRON+OFF-REF, (FRZ)
G:\ENVCAD\Info\RETURN-TOS\syrause-ny\B0046601\0008\00260\46601B03A.DWG LAYOUT: 4. SAVED: 6/24/2014 1:57 PM ACADVER: 18.1 (LMS TECH) PAGES/SETUP: -- PLOTSTYLE/TABLE: PLTULL-CTB PLOTTED: 2/19/2015 9:40 AM BY: LOVING, JEFF

IMAGES: PROJECTNAME: --

XREFS:
46601X02
46601X01



CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
5528 NW DOANE AVE., PORTLAND, OREGON
**SUB-SLAB SOIL VAPOR
INVESTIGATION REPORT**

**SUB-SLAB
SOIL VAPOR PROBE LOCATIONS**


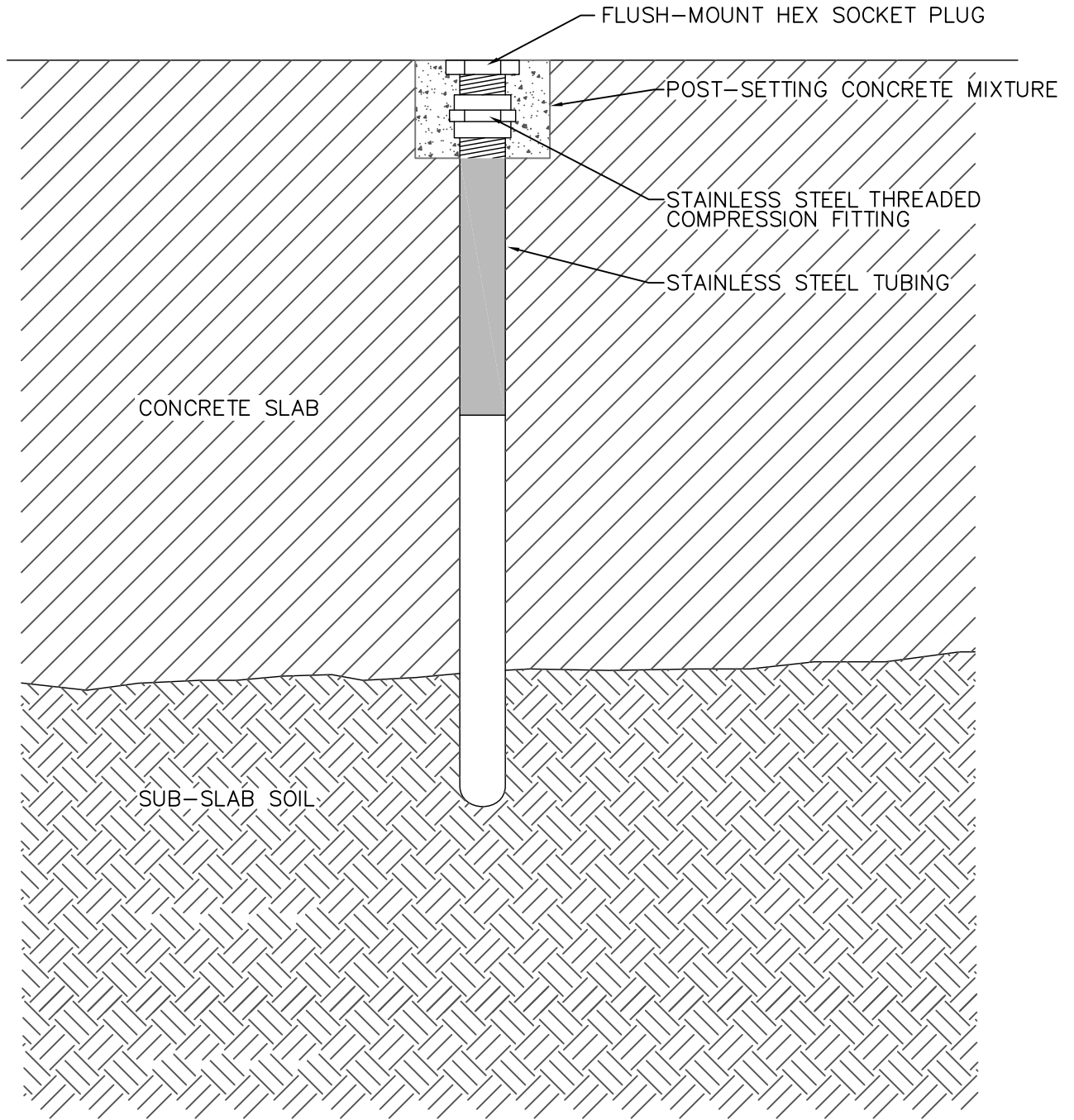


FIGURE
4



CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
5528 NW DOANE AVE., PORTLAND, OREGON
**SUB-SLAB SOIL VAPOR
INVESTIGATION REPORT**

SUB-SLAB SOIL VAPOR PROBE SCHEMATIC DIAGRAM



FIGURE
5



Tables

TABLE 1
HISTORICAL RELEASES
SUB-SLAB SOIL VAPOR INVESTIGATION REPORT
PHILLIPS 66 PORTLAND TERMINAL, CHEVRON SITE NO. 354972
5528 NW DOANE AVE., PORTLAND, OREGON
DEQ ECSI NO. 177

Spill Number ^a	Date	Location	Volume (gallons)	Product	Comments
39	01/21/79	Unspecified	8,500	Leaded regular gasoline	Failure of filter check valve. Contained in separator system; approximately 100 gallons may have entered sanitary sewer
40	04/28/81	Tank 4254	100	Asphalt	Tank leak
41	09/10/81	Tank 2669	310	RR-40	Tank overfill
42	06/22/82	Unspecified	127	RRA-40	Tank overfill of underground flush tank
43	07/19/82	Unspecified	800	ATF	Product line cracked during annual pressure test
44	07/19/82	ConocoPhillips Marine Dock Area	1,000	Diesel	Line "blow out"
45	01/25/83	Tank 3761	20	Diesel	Tank leak
46	05/01/85	Unspecified	15	NA	Tank overfill
47	05/30/85	Tank 4388	370	Unknown	Tank overflow
48	06/11/85	Pipeline beneath NW Front Avenue. 10-inch pipeline from tank 3579.	3,000	Fuel oil	Leak at broken flange gasket
49	07/29/85	Rail car loading and unloading area	20	Oil	Release flowed into sump drain
50	08/09/85	Tank 1289	40	Fuel additive S-13	Tank overfill
51	03/14/86	Tank F-11	10	Fuel additive	NA
52	03/14/86	Tank 4318	42	Asphalt (AR-400W)	Leaked from metering system
53	08/19/86	Unspecified	200	Oil (450 Neutral)	Rupture of heating vessel

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5528 NW DOANE AVE., PORTLAND, OREGON
DEQ ECSI NO. 177

Spill Number ^a	Date	Location	Volume (gallons)	Product	Comments
54	09/20/86	Electric steam pumps behind loading rack; Tank Farm #1	84	Fuel oil	Leaked from pump
55	01/26/87	Unspecified	70	Additive R-12F	Leaked from circulation pump
56	01/28/87	Marine Dock Area	10	NA	Product spilled while disconnecting fuel hose from vessel
57	04/15/88	Loading rack	1,300	Diesel	Fully contained
58	NA/8/89	Tank 36	50	Fuel oil	Drain overflowed
59	05/18/89	Electric steam pumps behind loading rack; Tank Farm #1	40	Diesel #2	Driver overfilled fueling tank (contained)
60	07/18/89	Tank car loading area	300	Acryloid	Contained
61	11/24/89	Unspecified	210	Fuel oil	Spilled onto ground from a steam pump
62	12/17/89	Rail car loading area	10	RR-40	Steam coil leaked (contained)
63	04/26/90	Loading rack	72	Unleaded gasoline	Equipment malfunction (contained)
64	07/04/90	ConocoPhillips Marine Dock Area	1	NA	Leaking gasket on abandoned asphalt line on dock
65	08/23/90	Lubricant oil loading rack	10	Gear lube	Overflowed truck (contained)
66	09/13/90	Loading rack	10	Regular leaded gasoline	Spring valve failed (contained)
67	05/06/91	Loading rack	50	Unleaded gasoline	Float failed (contained)
68	09/30/91	Unspecified	3	Oil additive	Bleeder valve vibrated open

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DEQ ECSI NO. 177

Spill Number ^a	Date	Location	Volume (gallons)	Product	Comments
69	09/04/92	Unspecified	50	Flush oil	Overflowed from underground flush tank (separator contained)
70	03/08/93	Unspecified	2,900	Lubricant oil Ramar 20/40	Overflowed (separator contained)
71	07/16/93	Marine Dock Area	2	Fuel oil #2	Leak in tank on barge
72	06/20/94	Marine Dock Area	10	Cutter oil	Release during transfer, faulty gasket
73	10/28/94	Unspecified	4,000	Unleaded gasoline	Pipeline pump valve failure
74	11/08/94	Marine Dock Area	4	Bunker fuel	Line failure during test
75	11/02/95	Unspecified	5,000	Block oil	Malfunctioned pump
76	02/22/97	Tank 3411	11,700	Unleaded gasoline	Overfilled tank 3411
77	12/19/97	Unspecified	2,500	Lube oil	Equipment failure at barrel filler, next to warehouse
78	11/03/98	ConocoPhillips Marine Dock Area	1	Fuel oil #2	Release during transfer
79	12/24/98	ConocoPhillips Marine Dock Area	5	Unleaded gasoline	Frozen pipe ruptured
80	02/10/99	ConocoPhillips Marine Dock Area	3	Diesel fuel	Release during transfer
81	11/02/99	ConocoPhillips Marine Dock Area	1	Diesel fuel	Release during transfer
82	06/15/00	Tank 2982	6,540	Kerosene	Equipment malfunction (sampling valve vibrated open)
83	12/21/00	Tank 2669	55	Marine diesel oil	Pinhole in tank
84	01/24/01	Unspecified	55	Diesel fuel	Release at tank
85	01/31/01	ConocoPhillips Marine Dock Area	1	Cutter oil	Release to river
86	03/26/01	ConocoPhillips Marine Dock Area	1	Diesel fuel	Release during transfer
87	06/20/01	ConocoPhillips Marine Dock Area	25	Marine diesel oil	Impacted soil above buried pipeline
88	09/28/01	ConocoPhillips Marine Dock Area	1	Unknown	Release during transfer

TABLE 1
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PHILLIPS 66 PORTLAND TERMINAL, CHEVRON SITE NO. 354972
5528 NW DOANE AVE., PORTLAND, OREGON
DEQ ECSI NO. 177

Spill Number ^a	Date	Location	Volume (gallons)	Product	Comments
89	02/02/02	Loading rack	100	Unleaded gasoline	Spill during filling
90	07/31/02	Unspecified	50	Oil	Release from relief valve
91	09/29/02	ConocoPhillips Marine Dock Area	1	Unknown	Sheen on river
92	10/15/02	ConocoPhillips Marine Dock Area	1	Marine diesel oil	Release during transfer
93	03/27/03	ConocoPhillips Marine Dock Area	1	Unknown	Sheen on river
94	08/13/03	ConocoPhillips Marine Dock Area	0.25	Unknown	Release during transfer
95	12/30/03	Unspecified	15	Diesel fuel	Release from tanker truck
96	06/28/04	Unspecified	40	Base oil	Relief valve failure
97	10/27/04	ConocoPhillips Marine Dock Area	200	Residual fuel	Release during transfer
98	09/10/05	ConocoPhillips Marine Dock Area	0.25	Fuel oil #2	Release during transfer
99	09/19/05	ConocoPhillips Marine Dock Area		Black oil	Potential release to river
100	05/19/06	Loading rack	15	Unknown	Release from tanker truck
101	01/29/07	Loading rack	1	Diesel fuel	Release from tanker truck
Total			50,052		

Notes:

^a Spill number correlates to Figure 3.

Releases with spill numbers 1 through 38 are located at the adjacent Chevron Willbridge Terminal and are not shown on Figure 3.

Shaded rows denote those where specific locations could not be determined

TABLE 2
HISTORICAL SOIL ANALYTICAL RESULTS
SUB-SLAB SOIL VAPOR INVESTIGATION REPORT
PHILLIPS 66 PORTLAND TERMINAL, CHEVRON SITE NO. 354972
5528 NW DOANE AVE., PORTLAND, OREGON
DEQ ECSI NO. 177

Sample ID	Units	Sample Date	Depth (feet)	BTEX				SVOCs				PAHs
				Benzene	Ethylbenzene	Toluene	Xylenes	1,4-Dichloro-benzene	Hexachloro-benzene	Naphthalene	1,2,4-Trichloro-benzene	Naphthalene
Occupational RBCs: Volatilization to Outdoor Air (mg/kg)				50	160	>Csat	>Csat	36	79	99	1,000	99
Occupational RBCs: Vapor Intrusion into Buildings (mg/kg)				1.2	12	>Csat	>Csat	17	79	99	1,000	99
Surface Soil												
T-SS-1	(mg/kg)	11/05/98	0-0.5	0.0500 U	0.0500 U	0.0500 U	0.0500 U	2.00 U	1.00 U	0.0280 U	1.00 U	--
T-SS-2	(mg/kg)	11/05/98	0-0.5	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0067 U
T-SS-3	(mg/kg)	11/05/98	0-0.5	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0335 U
T-SS-4	(mg/kg)	11/06/98	0-0.5	0.0500 U	0.0500 U	0.0500 U	0.0500 U	4.65 U	2.32 U	0.0813 U	2.32 U	0.00738 U
T-SS-5	(mg/kg)	11/06/98	0-0.5	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.074 U
T-SS-6	(mg/kg)	11/05/98	0-0.5	0.237	0.317	1.32	1.79	--	--	--	--	0.067 U
T-SS-7	(mg/kg)	11/05/98	0-0.5	0.0500 U	0.0500 U	0.0500 U	0.0500 U	2.00 U	1.00 U	0.0140 U	1.00 U	--
T-SS-8	(mg/kg)	11/05/98	0-0.5	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0067 U
T-SS-9	(mg/kg)	11/05/98	0-0.5	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0067 U
T-SS-10	(mg/kg)	11/05/98	0-0.5	0.0500 U	0.0500 U	0.0500 U	0.0500 U	4.00 U	2.00 U	0.0280 U	2.00 U	--
T-SS-11	(mg/kg)	11/06/98	0-0.5	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0808 U
T-SS-12	(mg/kg)	11/06/98	0-0.5	0.0500 U	0.0500 U	0.0500 U	0.0724	--	--	--	--	0.0074 U
T-SS-13	(mg/kg)	11/05/98	0-0.5	0.0500 U	0.0500 U	0.0500 U	0.0500 U	10.0 U	5.00 U	0.0700 U	5.00 U	--
T-SS-14	(mg/kg)	11/06/98	0-0.5	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.00738 U
T-SS-15	(mg/kg)	11/05/98	0-0.5	0.0500 U	0.0500 U	0.0500 U	0.0500 U	10.0 U	5.00 U	0.175 U	5.00 U	--
T-SS-16	(mg/kg)	11/05/98	0-0.5	0.0500 U	0.0500 U	0.0500 U	0.0500 U	1.00 U	0.500 U	0.0700 U	0.500 U	--
Subsurface Soils												
T-HP-1 (10)	(mg/kg)	11/03/98	10	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0067 U
T-HP-1 (20)	(mg/kg)	11/03/98	20	0.200 U	1.49	0.200 U	8.93	--	--	--	--	16.8 U
T-HP-1 (24)	(mg/kg)	11/03/98	24	0.0500 U	0.0500 U	0.0500 U	0.0500 U	1.00 U	0.500 U	0.00700 U	0.500 U	--
T-HP-2 (11)	(mg/kg)	11/03/98	11	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.013 U
T-HP-2 (20)	(mg/kg)	11/03/98	20	0.200 U	0.691	0.200 U	5.41	--	--	--	--	16.8 U
T-HP-2 (24)	(mg/kg)	11/03/98	24	0.0500 U	0.0500 U	0.0500 U	0.0500 U	1.00 U	0.500 U	0.00700 U	0.500 U	--
T-HP-3 (4)	(mg/kg)	11/04/98	4	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.168 U
T-HP-3 (20)	(mg/kg)	11/04/98	20	1.16	6.62	1.00 U	13.9	--	--	--	--	16.8 U
T-HP-3 (24)	(mg/kg)	11/04/98	24	0.0500 U	0.0500 U	0.0500 U	0.0500 U	1.00 U	0.500 U	0.00700 U	0.500 U	--
T-HP-4 (8)	(mg/kg)	11/03/98	8	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0067 U
T-HP-4 (20)	(mg/kg)	11/03/98	20	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0067 U
T-HP-4 (28)	(mg/kg)	11/03/98	28	0.0500 U	0.0500 U	0.0500 U	0.0500 U	1.00 U	0.500 U	0.00700 U	0.500 U	--
T-HP-5 (4)	(mg/kg)	10/14/98	4	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.67 U
T-HP-5 (10)	(mg/kg)	10/14/98	10	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0067 U
T-HP-5 (16)	(mg/kg)	10/14/98	16	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0067 U
T-HP-6 (3.5)	(mg/kg)	10/14/98	3.5	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.67 U
T-HP-6 (12)	(mg/kg)	10/14/98	12	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0268 U
T-HP-6 (28)	(mg/kg)	10/14/98	28	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0067 U
T-HP-7 (4)	(mg/kg)	10/14/98	4	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0067 U
T-HP-7 (12)	(mg/kg)	10/14/98	12	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0067 U
T-HP-7 (16)	(mg/kg)	10/14/98	16	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0067 U
T-RF-1 (1.5)	(mg/kg)	10/12/98	1.5	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0067 U
T-RF-1 (8)	(mg/kg)	10/12/98	8	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0067 U
T-RF-1 (12)	(mg/kg)	10/12/98	12	0.0500 U	0.0500 U	0.0500 U	0.0500 U	1.00 U	0.500 U	0.500 U	0.500 U	0.002 U
T-RF 2 (8)	(mg/kg)	10/13/98	8	0.0500 U	0.0500 U	0.0500 U	0.0500 U	--	--	--	--	0.0134 U
T-RF 2 (16)	(mg/kg)	10/13/98	16	0.0500 U	0.0500 U	0.0500 U	0.0500 U	1.00 U	0.500 U	0.00700 U	0.500 U	0.002 U

Note:

PAHs = Polycyclic Aromatic Hydrocarbons analyzed by 8270M-SIM

>Csat = The soil RBC exceeds the limit for three-phase equilibrium partitioning

SVOCs = Semi-volatile Organic Compounds analyzed by 8270C

U = Analyte not detected above the laboratory reporting limit presented

RBCs: Risk Based Concentrations

mg/kg = milligrams per kilogram

Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) analyzed by USEPA Method 8020

Sample points shown are associated with Figures 35,38,41 and 44 of the Remedial Investigation Report dated August 1, 2003.

Bold = Analyte detected above laboratory reporting limit

- = Not analyzed, not applicable

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
SUB-SLAB SOIL VAPOR INVESTIGATION REPORT
PHILLIPS 66 PORTLAND TERMINAL, CHEVRON SITE NO. 354972
5528 NW DOANE AVE., PORTLAND, OREGON
DEQ ECSI NO. 177

		TPH-G	TPH-D	TPH-O	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
Vapor Intrusion into Buildings RBCs		>S	>S	>S	2,800	>S	7,400	>S	1,100,000
Volatilization to Outdoor Air RBCs		>S	>S	>S	14,000	>S	41,000	>S	590,000
Well Identification	Date Sampled	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
B-4	05/26/00	-	-	-	82.3	12.7	4	14.8	-
	dup 05/26/00	-	-	-	74.8	10.7	2.77	10.3	-
	08/23/00	-	-	-	NS/F	NS/F	NS/F	NS/F	-
	11/29/00	-	-	-	7.04	5.81	2.10	8.09	-
	02/20/01	-	-	-	NS/F	NS/F	NS/F	NS/F	-
	05/17/01	-	-	-	NS/F	NS/F	NS/F	NS/F	-
	09/26/02	-	-	-	16.5	8.36	5.14	27.6	-
	09/25/03	-	-	-	48.1	7.55	6.02	17.9	-
	03/28/05	-	-	-	-	-	-	-	<2.00
	09/26/06	-	-	-	25.6	5.03	<0.500	6.46	<2.00
	03/21/07	-	-	-	43.2	5.10	1.33	7.02	<2.00
	09/20/07	-	-	-	2.65	2.59	<0.500	4.46	<2.00
	03/26/08	2,830 ¹¹	31,700 ⁵	<490	2.66	3.54	<1.00	4.90	<4.00
	09/24/08	943	30,800	566	0.900	2.98	<1.00	3.04	<1.00
B-35	dup 09/24/08	1,350	5,730	<481	1.72	4.62	<1.00	7.13	<1.00
	02/17/00	-	-	-	31.6	13.5	11	27.4	-
	05/26/00	-	-	-	194	16.3	12.5	39.8	-
	08/28/00	-	-	-	287	15.3	8.42	ND	-
	11/29/00	-	-	-	384	17.0	12.0	30.2	-
	02/23/01	-	-	-	45.6	4.87	12.4	20.5	-
	05/17/01	-	-	-	15.2	4.32	5.62	7.99	-
	09/20/01	-	-	-	58.0	3.31	9.78	15.9	-
	03/14/02	-	-	-	34.1	15.8	2.41	11.4	-
	09/26/02	-	-	-	95.8	11.3	14.0	26.3	-
	03/18/03	-	-	-	8.11	6.39	1.42	3.20	-
	09/25/03	-	-	-	66.7	7.41	3.74	19.2	-
	03/30/04	-	-	-	15.1	1.39	6.49	13.0	-
	09/28/04	-	-	-	93.4	11.7	<5.00	19.7	-
	03/28/05	-	-	-	3.71	6.72	0.660	10.5	7.20
	09/20/05	-	-	-	82.0	10.4	1.79	12.2	6.48
	03/14/06	-	-	-	18.8	7.31	1.32	10.9	-
	09/26/06	-	-	-	20.9	7.63	2.45	10.2	<2.00
	03/20/07	-	-	-	11.4	5.16	1.02	11.2	<2.00
	09/20/07	-	-	-	3.44	6.55	<0.500	10.1	<2.00
	03/27/08	1,120	88,300 ⁵	2,910 ¹²	1.65	3.00	<2.50	5.15	<10.0
	09/24/08	1,720	21,300	868	3.48	6.72	<2.00	10.68	<2.00
	03/23/09	1,240	21,700	1,110	2.44	6.88	<1.00	9.83	<1.00
	09/18/09	1,110	16,200	871	2.80	7.38	<1.00	9.84	<1.00
	dup 09/18/09	1,110	6,960	<490	2.76	6.86	<2.00	5.90	<2.00
	03/31/10	1,290	32,600	1,510	2.40	6.32	<2.00	6.12	<2.00
	03/24/11	1,650	3,920	<476	5.37	3.84	<1.00	9.38	<1.00
	dup 03/24/11	1,670	6,590	<472	5.56	4.00	<1.00	9.96	<1.00
	09/27/11	1,560	19,900	1,110	6.68	3.99	<1.00	8.03	<1.00
	03/28/12	1,500	11,000 B	670	3.5	4.7	0.51 J	8.3	0.21 J
	10/2/12	1,300	6,700	650	12	6.4	<2.0	9.2	<2.0
	4/2/13	2,300	3,300	<520	6.3	5.8	<1.0	10	<1.0
	9/12/13	1,800	1,500	<260	2.6	5.6	<0.50	8.2	<1.0
	3/10/14	1,700	4,200	340	1.4	5.6	<1.0	9.6	<2.0
	9/8/14	1,200	8,200	730	3.8	4.3	<1.0	5.9	<2.0
	dup 9/8/14	1,200	17,000	1,500	3.6	4.0	<1.0	5.9	<2.0
B-36	02/17/00	-	-	-	0.925	1.16	0.762	3.16	-
	05/26/00	-	-	-	ND	0.82	0.502	ND	-
	08/28/00	-	-	-	2.08	2.54	0.693	2.53	-
	11/29/00	-	-	-	1.14	2.53	1.02	2.78	-
	02/23/01	-	-	-	ND	0.512	1.15	1.44	-
	05/17/01	-	-	-	ND	0.545	0.819	1.8	-
	09/20/01	-	-	-	ND	0.609	0.761	1.50	-
dup	09/20/01	-	-	-	ND	0.547	0.820	1.51	-

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
SUB-SLAB SOIL VAPOR INVESTIGATION REPORT
PHILLIPS 66 PORTLAND TERMINAL, CHEVRON SITE NO. 354972
5528 NW DOANE AVE., PORTLAND, OREGON
DEQ ECSI NO. 177

		TPH-G	TPH-D	TPH-O	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
Vapor Intrusion into Buildings RBCs		>S	>S	>S	2,800	>S	7,400	>S	1,100,000
Volatilization to Outdoor Air RBCs		>S	>S	>S	14,000	>S	41,000	>S	590,000
Well Identification	Date Sampled	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
B-36	03/14/02	-	-	-	ND	ND	ND	ND	-
	09/26/02	-	-	-	1.18	1.33	0.635	2.48	-
	03/18/03	-	-	-	ND	ND	ND	ND	-
	09/25/03	-	-	-	0.940	1.10	0.954	2.90	-
	03/30/04	-	-	-	<0.500	<0.500	<0.500	1.23	-
	09/28/04	-	-	-	0.614	0.679	<0.500	<1.00	-
	03/28/05	-	-	-	<0.200	<0.500	<0.500	<1.00	<2.00
	09/20/05	-	-	-	0.390	0.930	<0.500	<1.00	2.63
	03/14/06	-	-	-	<0.500	<0.500	<0.500	<1.00	-
	09/26/06	-	-	-	0.760	1.18	<0.500	1.57	3.50
	03/20/07	-	-	-	0.610	0.500	<0.500	1.37	<2.00
	09/20/07	-	-	-	1.32	1.67	<0.500	1.72	3.47
	03/27/08	227	469³	<476	<0.400	<1.00	<1.00	<2.00	<4.00
	09/24/08	947	632	<485	0.480	<2.00	<2.00	<6.00	<2.00
	03/23/09	<80.0	<248	<495	<0.200	<1.00	<1.00	<3.00	<1.00
	dup 03/23/09	102	<248	<495	<0.200	<1.00	<1.00	<3.00	<1.00
	09/18/09	885	704	<490	0.53	1.23	<1.00	<3.00	<1.00
	03/31/10	<80.0	<245	<490	<0.200	<1.00	<1.00	<3.00	<1.00
	09/23/10	995	299	<0.500	0.380	<1.00	<1.00	<3.00	1.04
	dup 09/23/10	950	465	<490	0.410	<1.00	<1.00	<3.00	<1.00
	03/24/11	<80.0	<100	<500	<0.200	<1.00	<1.00	<3.00	<1.00
	09/27/11	805	459	<500	<0.200	<1.00	<1.00	<3.00	<1.00
	03/28/12	<33	130 B	<40	<0.060	<0.090	<0.080	<0.31	<0.090
	dup 03/28/12	35 J	100 J B	<42	<0.060	<0.090	<0.080	<0.31	<0.090
	10/02/12	360	5400	<500	<1.0	<1.0	<1.0	<3.0	<1.0
	dup 10/2/12	340	5,500	<480	<1.0	<1.0	<1.0	<3.0	<1.0
	4/2/13	310	1,100	<520	<1.0	<1.0	<1.0	<3.0	<1.0
	9/12/13	420	180	<240	<0.20	<0.50	<0.50	<1.0	<1.0
	9/12/13	420	180	<240	<0.20	<0.50	<0.50	<1.0	<1.0
	3/13/14	57	960	<260	<0.20	<0.50	<0.50	<1.0	<1.0
	9/8/14	1,700	10,000	730	0.86	1.3	<1.0	<2.0	<2.0
B-37	02/17/00	-	-	-	ND	0.517	0.63	1.18	-
	dup 02/17/00	-	-	-	0.342	1.06	0.795	1.97	-
	05/26/00	-	-	-	ND	ND	ND	ND	-
	08/28/00	-	-	-	ND	ND	ND	ND	-
	11/29/00	-	-	-	ND	ND	ND	ND	-
	02/23/01	-	-	-	ND	ND	ND	ND	-
	05/17/01	-	-	-	ND	ND	ND	ND	-
	03/14/02	-	-	-	ND	ND	ND	ND	-
	09/26/02	-	-	-	ND	ND	ND	ND	-
	03/18/03	-	-	-	ND	ND	ND	ND	-
	dup 03/18/03	-	-	-	ND	ND	ND	ND	-
	09/25/03	-	-	-	<0.500	<0.500	0.639	1.30	-
	dup 09/25/03	-	-	-	<0.500	<0.500	0.628	1.24	-
	03/31/04	-	-	-	<0.500	<0.500	<0.500	<1.00	-
	09/28/04	-	-	-	<0.500	<0.500	<0.500	<1.00	-
	03/28/05	-	-	-	<0.200	<0.500	<0.500	<1.00	3.98
	09/20/05	-	-	-	<0.200	<0.500	<0.500	<1.00	6.14
	09/20/05	-	-	-	-	-	-	-	5.82
	03/14/06	-	-	-	<0.500	<0.500	<0.500	<1.00	-
	dup 03/14/06	-	-	-	<0.500	<0.500	<0.500	<1.00	-
	09/26/06	-	-	-	<0.200	<0.500	<0.500	<1.00	<2.00
	03/20/07	-	-	-	<0.200	<0.500	<0.500	<1.00	<2.00
	09/20/07	-	-	-	<0.200	<0.500	<0.500	<1.00	<2.00
	03/27/08	147¹¹	<240	<481	<0.200	<0.500	<0.500	<1.00	<2.00
	09/24/08	188	<243	<485	<0.200	<1.00	<1.00	<3.00	<1.00
	03/20/09	156	<243	<485	<0.200	<1.00	<1.00	<3.00	<1.00
	dup 03/20/09	145	<243	<485	<0.200	<1.00	<1.00	<3.00	<1.00

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
SUB-SLAB SOIL VAPOR INVESTIGATION REPORT
PHILLIPS 66 PORTLAND TERMINAL, CHEVRON SITE NO. 354972
5528 NW DOANE AVE., PORTLAND, OREGON
DEQ ECSI NO. 177

		TPH-G	TPH-D	TPH-O	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
Vapor Intrusion into Buildings RBCs		>S	>S	>S	2,800	>S	7,400	>S	1,100,000
Volatilization to Outdoor Air RBCs		>S	>S	>S	14,000	>S	41,000	>S	590,000
Well Identification	Date Sampled	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
B-37 dup	09/18/09	107	<248	<495	<0.200	<1.00	<1.00	<3.00	<1.00
	03/31/10	150	<243	<485	<0.200	<1.00	<1.00	<3.00	<1.00
	03/31/10	126	<250	<500	<0.200	<1.00	<1.00	<3.00	<1.00
	09/23/10	161	<100	<500	<0.200	<1.00	<1.00	<3.00	<1.00
	03/24/11	<80.0	<94.3	<472	<0.200	<1.00	<1.00	<3.00	<1.00
	09/28/11	151	<105	<526	<0.200	<1.00	<1.00	<3.00	<1.00
	03/28/12	<33	52 J B	<40	<0.060	<0.090	<0.080	<0.31	<0.090
B-40	02/17/00	-	-	-	-	-	-	-	-
	05/26/00	-	-	-	-	-	-	-	-
	08/28/00	-	-	-	-	-	-	-	-
	11/29/00	-	-	-	-	-	-	-	-
	02/20/01	-	-	-	-	-	-	-	-
	05/17/01	-	-	-	-	-	-	-	-
	09/26/06	-	-	-	21.5	2.94	89.4	225	<4.00
	03/20/07	-	-	-	15.2	2.74	86	213	<4.00
	09/20/07	-	-	-	15.9	2.12	63.6	153	<2.00
	3/26/08	2,860	37,600³	5,700	3.4	1.85	61.6	132	<2.00
	9/17/13	3,100	74,000	21,000	<0.20	1	10	17	<1.0
	9/8/14	2,300	48,000	12,000	<0.40	<1.0	7.3	12	<2.0
OF-1	03/26/08	953¹¹	6,920⁵	<490	<0.200	<0.500	<0.500	<1.00	<2.00
	09/18/09	82.8	44,400	985	<0.200	<1.00	<1.00	<3.00	<1.00
	03/31/10	<80.0	11,300	<500	<0.200	<1.00	<1.00	<3.00	<1.00
	09/23/10	<80.0	7,620	<485	<0.200	<1.00	<1.00	<3.00	<1.00
	03/24/11	<80.0	<94.3	<472	<0.200	<1.00	<1.00	<3.00	<1.00
	09/28/11	<80.0	1,270	<526	<0.200	<1.00	<1.00	<3.00	<1.00
P-1	03/17/03	-	-	-	ND	ND	ND	ND	-
	03/31/04	-	-	-	<0.500	<0.500	<0.500	<1.00	-
	09/28/04	-	-	-	<0.500	<0.500	<0.500	<1.00	-
	03/28/05	-	-	-	-	-	-	-	<2.00
	03/14/06	-	-	-	<0.500	<0.500	<0.500	<1.00	-
	09/26/06	-	-	-	<0.200	<0.500	<0.500	<1.00	<2.00
	03/20/07	-	-	-	<0.200	<0.500	<0.500	<1.00	<2.00
	09/20/07	-	-	-	<0.200	<0.500	<0.500	<1.00	<2.00
Well Abandoned									
P-1A dup dup dup dup dup	01/28/08	<80.0	<238	<476	0.990	0.590	<0.500	<1.00	<2.00
	03/26/08	<80.0	<245	<490	0.240	<0.500	<0.500	<1.00	<2.00
	06/25/08	<80.0	<236	<472	1.99	1.32	<0.500	<1.00	<2.00
	09/23/08	<80.0	<243	<485	1.87	<1.00	<1.00	<3.00	<1.00
	01/07/09	<80.0	<250	<500	<0.200	<1.00	<1.00	<3.00	<1.00
	03/20/09	<80.0	<250	<500	<0.200	<1.00	<1.00	<3.00	<1.00
	09/18/09	<80.0	<248	<495	0.320	<1.00	<1.00	<3.00	<1.00
	03/31/10	<80.0	<240	<481	<0.200	<1.00	<1.00	<3.00	<1.00
	09/23/10	<80.0	<98	<490	<0.200	<1.00	<1.00	<3.00	<1.00
	03/24/11	<80.0	672	<472	<0.200	<1.00	<1.00	<3.00	<1.00
	09/27/11	<80.0	<125	<625	<0.200	<1.00	<1.00	<3.00	<1.00
	09/27/11	<80.0	<111	<556	<0.200	<1.00	<1.00	<3.00	<1.00
	03/28/12	<33	<30	<40	<0.060	<0.090	<0.080	<0.31	<0.090
	10/04/2012	<80	280	<480	<1.0	<1.0	<1.0	<3.0	<1.0 *
	10/05/2012	<80	340	<480	<1.0	<1.0	<1.0	<3.0	<1.0 *
	04/03/13	<80	<110	<540	<1.0	<1.0	<1.0	<3.0	<1.0
	4/3/13	<80	<100	<510	<1.0	<1.0	<1.0	<3.0	<1.0
	9/12/13	<80	150	<250	0.99	<0.50	<0.50	<1.0	<1.0
	3/13/14	<50	230	340	<0.20	<0.50	<0.50	<1.0	<1.0
	3/13/14	<50	170	<270	<0.20	<0.50	<0.50	<1.0	<1.0
	9/3/14	<50	260	<260	0.36	<0.50	<0.50	<1.0	<1.0
	9/3/14	<50	140	<260	0.49	<0.50	<0.50	<1.0	<1.0
U-2	02/17/00	-	-	-	3.13	1.93	3.59	3.43	-
	05/26/00	-	-	-	0.885	1.45	ND	ND	-

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
SUB-SLAB SOIL VAPOR INVESTIGATION REPORT
PHILLIPS 66 PORTLAND TERMINAL, CHEVRON SITE NO. 354972
5528 NW DOANE AVE., PORTLAND, OREGON
DEQ ECSI NO. 177

		TPH-G	TPH-D	TPH-O	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
Vapor Intrusion into Buildings RBCs		>S	>S	>S	2,800	>S	7,400	>S	1,100,000
Volatilization to Outdoor Air RBCs		>S	>S	>S	14,000	>S	41,000	>S	590,000
Well Identification	Date Sampled	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
U-2	08/28/00	-	-	-	ND	ND	0.604	ND	-
	11/29/00	-	-	-	ND	ND	ND	ND	-
	02/23/01	-	-	-	ND	ND	ND	ND	-
	05/17/01	-	-	-	ND	ND	ND	ND	-
	09/20/01	-	-	-	ND	ND	ND	ND	-
	03/14/02	-	-	-	0.986	1.60	0.905	ND	-
	09/26/02	-	-	-	ND	ND	ND	ND	-
	03/18/03	-	-	-	ND	ND	ND	ND	-
	09/25/03	-	-	-	<0.500	<0.500	<0.500	<1.00	-
	03/31/04	-	-	-	2.60	<0.500	0.820	<1.00	-
	09/28/04	-	-	-	<0.500	<0.500	<0.500	<1.00	-
	03/28/05	-	-	-	<0.200	<0.500	<0.500	<1.00	<2.00
	09/20/05	-	-	-	<0.200	<0.500	<0.500	<1.00	<2.00
	03/14/06	-	-	-	4.71	<0.500	3.19	1.05	-
	09/27/06	-	-	-	<0.200	<0.500	<0.500	<1.00	<2.00
	03/20/07	-	-	-	4.05	<0.500	1.10	<1.00	<2.00
	09/19/07	-	-	-	<0.200	<0.500	<0.500	<1.00	<2.00
	03/25/08	1,010	673³	<476	8.15	0.630	1.88	<1.00	<2.00
	09/25/08	<80.0 ¹⁶	<243	<485	<0.200	<1.00	<1.00	<3.00	<1.00
	03/17/09	970	399	<485	5.08	<1.00	<1.00	<3.00	<1.00
	09/21/09	112	42¹⁴	240¹⁴	0.25¹⁴	<1.0	<1.0	<3.0	<1.0
	03/16/10	96.8	<75	<380	0.42¹⁴	<1.0	<1.0	<3.0	<1.0
	09/20/10	98.8^{14,19}	<35.1	<57.8	2.5	0.27¹⁴	<0.20	<0.42	<0.16
	03/22/11	538	62.7¹⁴	<58.1	1.7	<0.21	0.35¹⁴	<0.42	<0.16
	09/30/11	3,430	187	<192	17.6	0.80J	7.9	4.9	<0.050
	03/30/12	1,100	430 B	<40	4.3	0.38 J	0.37 J	0.62 J	<0.18
U-5	02/17/00	-	-	-	3.86	0.654	0.501	2.54	-
	05/26/00	-	-	-	3.49	ND	ND	ND	-
	08/28/00	-	-	-	ND	ND	ND	ND	-
	11/29/00	-	-	-	ND	ND	ND	ND	-
	02/23/01	-	-	-	1.56	1.16	ND	ND	-
	05/17/01	-	-	-	-	-	-	-	-
	03/18/03	-	-	-	2.49	2.21	5.77	33.7	-
	09/25/03	-	-	-	2.39	1.71	7.89	7.66	-
	03/31/04	-	-	-	1.53	<0.500	<0.500	<1.00	-
	09/28/04	-	-	-	<0.500	0.806	<0.500	1.80	-
	03/28/05	-	-	-	<0.200	<0.500	<0.500	<1.00	<2.00
	09/20/05	-	-	-	<0.200	<0.500	<0.500	<1.00	<2.00
	03/14/06	-	-	-	0.560	<0.500	<0.500	<1.00	-
	09/26/06	-	-	-	<0.200	<0.500	<0.500	<1.00	<2.00
	03/20/07	-	-	-	<0.200	<0.500	<0.500	<1.00	<2.00
	09/20/07	-	-	-	<0.200	<0.500	<0.500	<1.00	<2.00
	09/24/08	652	26,700	3,870	<0.200	<1.00	<1.00	<3.00	<1.00
	3/19/09	NS	-	-	-	-	-	-	-
	4/3/13	490	-	-	<1.0	<1.0	<1.0	<3.0	<1.0
U-13	09/28/04	-	-	-	39.7	6.2	14.3	11.3	-
	03/30/12	6,100	23,000 B	270 J	<1.2	<1.8	150	6.8 J	<1.8
U-14	09/27/06	-	3,980¹	<526 ¹	<0.200	<0.500	<0.500	<1.00	<2.00
	03/21/07	<80.0	428³	<500	<0.200	<0.500	<0.500	<1.00	<2.00
	09/19/07	2,760	1,920⁹	<500	<1.00 ¹⁰	<2.50 ¹⁰	<2.50 ¹⁰	<5.00 ¹⁰	<10.0 ¹⁰
	03/25/08	<80.0	<238	<476	<0.200	<0.500	<0.500	<1.00	<2.00
	09/25/08	<80.0 ¹⁶	<243	<485	<0.200	<1.00	<1.00	<3.00	<1.00
	03/18/09	<80.0	<243	<485	<0.200	<1.00	<1.00	<3.00	<1.00
	09/22/09	27.5¹⁴	<77	<380	<1.0	<1.0	<1.0	<3.0	<1.0
	03/16/10	<50	<76	<380	<1.0	<1.0	<1.0	<3.0	<1.0
	09/21/10	14.6¹⁴	<35.2	<58.1	<0.12	<0.21	<0.20	<0.42	<0.16
	03/22/11	<6.9	<35.1	<57.8	<0.12	<0.21	<0.20	<0.42	<0.16
	09/28/11	20.4¹⁴	43	<190	0.028¹⁴	0.027¹⁴	<0.070	<0.080	<0.050

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PHILLIPS 66 PORTLAND TERMINAL, CHEVRON SITE NO. 354972
5528 NW DOANE AVE., PORTLAND, OREGON
DEQ ECSI NO. 177

		TPH-G	TPH-D	TPH-O	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
Vapor Intrusion into Buildings RBCs		>S	>S	>S	2,800	>S	7,400	>S	1,100,000
Volatilization to Outdoor Air RBCs		>S	>S	>S	14,000	>S	41,000	>S	590,000
Well Identification	Date Sampled	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
U-14	04/02/12	<33	<30	<40	<0.060	<0.090	<0.080	<0.31	<0.090
	10/02/12	<80	120	<480	<1.0	<1.0	<1.0	<3.0	<1.0
U-15	09/27/06	-	466	<485	7.01	<0.500	1.38	<1.00	<2.00
	03/21/07	<80.0	465 ⁴	<490	0.560	<0.500	<0.500	<1.00	<2.00
	09/19/07	88.7	377 ⁴	<500	1.72	<0.500	<0.500	<1.00	<2.00
	03/25/08	132	<238	<476	1.47	<0.500	0.600	<1.00	<2.00
	09/25/08	<80.0 ¹⁶	<243	<485	0.860	<1.00	1.28	<3.00	<1.00
	03/17/09	711	314	5,310	2.26	<1.00	15.9	20.0	<1.00
	09/21/09	22.6 ¹⁴	<76	110 ¹⁴	<1.0	<1.0	<1.0	<3.0	<1.0
	03/16/10	1,230	<76	<380	8.8	0.38 ¹⁴	75.9	72.9	<1.0
	09/20/10	266 ¹⁹	<35.1	<57.8	0.88 ¹⁴	<0.21	6.2	10.5	<0.16
	03/21/11	2,220	<35.1	<57.8	4.7	0.33 ¹⁴	59	71.2	<0.16
	09/27/11	35.9 ¹⁴	<37.9	<190	0.13 ¹⁴	0.032 ¹⁴	0.98 ¹⁴	1.9 ¹⁴	0.062 ¹⁴
	03/30/12	33 J	74 J B	520	<0.060	<0.090	<0.080	<0.31	<0.090
	03/30/12	34 J	37 J B	78 J	<0.060	<0.090	<0.080	<0.31	<0.090
	09/27/2012	<80	220	<480	<1.0	<1.0	<1.0	<3.0	<1.0
U-16	09/27/06	-	2,530	<500	0.440	<0.500	5.43	<1.00	<2.00
	03/21/07	277	3,630 ⁵	860 ⁶	0.220	<0.500	0.930	<1.00	<2.00
	09/19/07	456	2,800 ⁵	590	<0.200	<0.500	<0.500	<1.00	<2.00
	03/25/08	308	1,410 ³	<476	<0.200	<0.500	<0.500	<1.00	<2.00
	09/25/08	642 ¹⁶	2,230	<485	0.620	<2.00	<2.00	<6.00	<2.00
	03/17/09	657	2,280	497	0.640	<2.00	<2.00	<6.00	<2.00
	09/21/09	1,030	330	100 ¹⁴	0.56 ¹⁴	0.36 ¹⁴	0.46 ¹⁴	0.78 ¹⁴	0.53 ¹⁴
	03/16/10	662	160	<380	0.34 ¹⁴	0.45 ¹⁴	0.39 ¹⁴	5.3	2
	09/20/10	887 ¹⁹	196	<57.8	0.46 ¹⁴	0.54 ¹⁴	0.35 ¹⁴	3.2	0.75 ¹⁴
	03/21/11	1,480	215	<57.8	0.25 ¹⁴	0.35 ¹⁴	0.30 ¹⁴	0.66 ¹⁴	0.37 ¹⁴
	09/27/11	1,730	254	<190	0.27 ^{14,19}	0.61 ^{14,19}	0.31 ¹⁴	0.85 ^{14,19}	0.17 ¹⁴
	03/30/12	470	380 B	41 J	<0.060	0.11 J	0.092 J	<0.31	1.4
	09/27/2012	1,100	1700	<500	<1.0	<1.0	<1.0	<3.0	<1.0
U-17	09/27/06	-	4,540	<500	<0.200	<0.500	<0.500	<1.00	<2.00
	03/21/07	305	5,560 ⁴	<500	<0.450	<0.500	<0.500	<1.00	<2.00
	09/19/07	277	2,810 ⁵	<500	<0.200	<0.500	<0.500	<1.00	<2.00
	03/25/08	780	941 ³	<476	0.640	1.26	<1.00	<2.00	<4.00
	09/25/08	808 ¹⁶	688	<485	<0.400	<2.00	<2.00	<6.00	<2.00
	03/17/09	898	981	<478	<0.400	<2.00	<2.00	<6.00	<2.00
	09/21/09	1,200	1,300	170 ¹⁴	0.14 ¹⁴	0.39 ¹⁴	<1.0	0.39 ¹⁴	<1.0
	03/16/10	1,090	540	<380	0.20 ¹⁴	0.58 ¹⁴	0.28 ¹⁴	5.5	<1.0
	09/20/10	717 ¹⁹	713	<57.8	0.22 ¹⁴	0.55 ¹⁴	1.0	2.7 ¹⁴	0.26 ¹⁴
	03/21/11	708	838	<57.5	0.18 ¹⁴	0.35 ¹⁴	0.40 ¹⁴	1.4 ¹⁴	0.74 ¹⁴
	09/27/11	1,720	1,320	<190	0.085 ^{14,19}	0.22 ^{14,19}	0.36 ¹⁴	0.53 ^{14,19}	0.45 ¹⁴
	03/30/12	1,100	100 B	<40	0.12 J	0.31 J	0.090 J	<0.31	<0.090
	09/27/2012	530	2900	<480	<1.0	<1.0	<1.0	<3.0	<1.0
U-18	03/21/07	207	16,300	6,000	0.210	0.540	<0.500	<1.00	<2.00
	09/19/07	517	9,980 ⁵	1,860	3.06	0.890	<0.500	1.05	<2.00
	03/25/08	239	607 ³	<476	2.36	0.850	<0.500	<1.00	<2.00
	09/25/08	941 ¹⁶	1,540	<485	1.32	2.24	<2.00	<6.00	<2.00
	03/17/09	<80.0	<236	<472	<0.400	<2.00	<2.00	<6.00	<2.00
	09/22/09	879	5,800	2,300	0.71 ¹⁴	2.1	<1.0	4.1	<1.0
	03/16/10	45 ¹⁴	64 ¹⁴	<380	<1.0	<1.0	<1.0	<3.0	<1.0
	09/21/10	259	332	<58.7	<0.12	1.1	<0.20	<0.42	<0.16
	03/21/11	785	673	<57.5	0.089 ¹⁴	0.53 ¹⁴	0.094 ¹⁴	0.44 ¹⁴	<0.050
	09/28/11	1,150	751	<190	0.076 ^{14,19}	0.60 ^{14,19}	0.12 ¹⁴	0.34 ^{14,19}	<0.050
	03/30/12	110	140 B	<40	<0.060	0.11 J	<0.080	<0.31	<0.090
	09/27/2012	320	5300	560	<1.0	<1.0	<1.0	<3.0	<1.0
U-19	03/21/07	2,540	2,020	<490	<0.200	<0.500	0.670	<1.00	9.31
	09/19/07	3,160	1,470 ³	<485	<0.200	<0.500	1.02	<1.00	22.0
	03/25/08	1,950	522 ³	<476	<0.400	<1.00	<1.00	<2.00	<4.00
	09/25/08	-	-	-	-	-	-	-	-

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
SUB-SLAB SOIL VAPOR INVESTIGATION REPORT
PHILLIPS 66 PORTLAND TERMINAL, CHEVRON SITE NO. 354972
5528 NW DOANE AVE., PORTLAND, OREGON
DEQ ECSI NO. 177

		TPH-G	TPH-D	TPH-O	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
Vapor Intrusion into Buildings RBCs		>S	>S	>S	2,800	>S	7,400	>S	1,100,000
Volatilization to Outdoor Air RBCs		>S	>S	>S	14,000	>S	41,000	>S	590,000
Well Identification	Date Sampled	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
U-20	04/02/12	86	63 J Z	<42	<0.060	<0.090	<0.080	<0.31	<0.090
	03/20/07	561	4,530	561 ⁸	<0.200	<0.500	<0.500	<1.00	4.28
	09/19/07	512	1,460 ³	<526	<0.200	<0.500	<0.500	<1.00	6.90
	03/25/08	240	631 ³	<490	<0.200	<0.500	<0.500	<1.00	5.51
	03/25/08	244	600 ³	<490	<0.200	<0.500	<0.500	<1.00	5.82
	09/25/08	3,600 ¹⁶	1,450	<485	<1.00 ¹⁸	<5.00 ¹⁸	<5.00 ¹⁸	<15.00 ¹⁸	7.80 ¹⁸
	03/17/09	295	563	<485	9.88	4.35	3.74	8.26	2.88
	09/21/09	328	400	110 ¹⁴	<1.0	<1.0	<1.0	0.21 ¹⁴	4.7
	03/16/10	216	230	<380	<1.0	<1.0	<1.0	<3.0	5.3
	09/21/10 ²⁰	279	273	<59.2	<0.12	<0.21	<0.20	<0.42	5.6
	03/21/11	350	545	<57.8	<0.12	<0.21	<0.20	<0.42	3.7
	09/28/11	385	290	<200	0.027 ¹⁴	0.014 ¹⁴	<0.070	0.14 ¹⁴	3.4
	03/29/12	110	98 J	<44	<0.060	<0.090	<0.080	<0.31	1.4
	09/27/2012	190	1100	<500	<1.0	<1.0	<1.0	<3.0	2.9
U-21	03/20/07	2,060	3,600 ⁷	<490	0.270	<0.500	2.50	<1.00	<2.00
	09/19/07	2,070	3,050 ³	<500	<1.00 ¹⁰	<2.50 ¹⁰	3.60	<5.00 ¹⁰	<10.0 ¹⁰
	03/26/08	1,230	9453	<490	<1.00 ¹⁰	<2.50 ¹⁰	<2.50 ¹⁰	<5.00 ¹⁰	<10.0 ¹⁰
	09/25/08	706 ¹⁶	807	<485	<0.200	<1.00	<1.00	<3.00	5.27
	03/17/09	1,810	1,190	<485	<0.200	<1.00	<1.00	<3.00	5.61
	09/22/09	3,910	500	89 ¹⁴	0.1714	<1.0	1.2	0.50 ¹⁴	8.2
	03/16/10	648	190	<390	<1.0	<1.0	<1.0	<3.0	6.9
	09/21/10 ²⁰	1,430	220	<58.7	<0.12	<0.21	<0.20	<0.42	12.9
	03/21/11	1,200	348	<57.8	<0.12	<0.21	<0.20	<0.42	4.4
	09/28/11	3,220	500	<190	0.098 ^{14,19}	0.13 ^{14,19}	0.30 ¹⁴	0.31 ^{14,19}	6.2
	09/28/11	3,860	466	<190	0.12 ^{14,19}	0.16 ^{14,19}	0.40 ¹⁴	0.35 ¹⁴	<0.050
	03/29/12	1,000	360	<40	<0.060	<0.090	0.10 J	<0.31	4
	09/27/2012	2,100	2200	<480	<5.0	<5.0	<5.0	<15	6.9

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
SUB-SLAB SOIL VAPOR INVESTIGATION REPORT
PHILLIPS 66 PORTLAND TERMINAL, CHEVRON SITE NO. 354972
5528 NW DOANE AVE., PORTLAND, OREGON
DEQ ECSI NO. 177

Notes:

Data collected prior to 4Q11 are presented as they were reported by previous consultants

J = result is less than reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value

B = compound was found in the blank sample

2/00 and 5/00 data from IT Corporation

8/00, 11/00, 2/01 and 5/01 data from KHM Environmental Management, Inc.

µg/L = Micrograms per liter

Bold = Analyte detected above laboratory reporting limit

- = Not analyzed, not applicable

ND = Not detected at or below detection limit

<0.200 = Not detected above the laboratory method reporting limit (MRL) of 0.200 µg/L.

TPH-G = Total petroleum hydrocarbons in the gasoline range

TPH-D = Total petroleum hydrocarbons in the diesel range

TPH-O = Total petroleum hydrocarbons in the heavy oil range

BTEX and MTBE analysis by USEPA Method 8021B or 8260B

TPH-G analysis using Northwest Method NWTPH-Gx

TPH-D and TPH-O analysis using Northwest Method NWTPH-Dx with quick silica gel cleanup.

dup = duplicate for sample in row above

RBCs = Risk Based Concentrations

>S = Groundwater RBC exceeds the solubility limit

¹ = The reporting limit for this analyte was raised to compensate for the limited sample quantity available for analysis.

² = The reporting limit for this analyte was raised to compensate for the limited sample quantity available for analysis.

³ = Detected hydrocarbons appear to be due to heavy gas/light diesel range components as well as weathered diesel.

⁵ = Hydrocarbon pattern most closely resembles weathered diesel.

⁶ = The hydrocarbons present are a complex mixture of diesel range and heavy oil range organics.

⁷ = Detected hydrocarbons appear to be due to heavy gas/light diesel range components as well as biogenic interference.

⁹ = Hydrocarbon pattern most closely resembles weathered jet fuel or similar light diesel range product.

¹⁰ = The reporting limit was raised due to sample matrix effects.

¹¹ = Detected hydrocarbons in the gasoline range appear to be due to overlap of diesel range hydrocarbons.

¹² = Heavy oil range organics present are due to hydrocarbons eluting primarily in the diesel range.

¹⁴ = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

¹⁶ = The sample was analyzed one day past holding time.

¹⁸ = The reporting limit was raised due to high concentrations non-target analytes.

¹⁹ = Analyte was detected in the associated method blank

²⁰ = Samples U-20 and U-21 were identified incorrectly (labels switched) in the field.

TABLE 4
SOIL GAS ANALYTICAL RESULTS – VOCs
SUB-SLAB SOIL VAPOR INVESTIGATION REPORT
PHILLIPS 66 PORTLAND TERMINAL, CHEVRON SITE NO. 354972
5528 NW DOANE AVE., PORTLAND, OREGON
DEQ ECSI NO. 177

Sample ID	DEQ Soil Gas RBC	SSVP-1	SSVP-2	SSVP-2 Dup	SSVP-3	SSVP-4	SSVP-5	SSVP-6	SSVP-7	EB-1
Sample Date	Vapor Intrusion into Buildings	12/05/14	12/05/14	12/05/14	12/04/14	12/04/14	12/04/14	12/04/14	12/04/14	12/05/14
Dilution Factor	Occupational	2.42	2.44	2.37	2.26	2.52	2.28	2.23	2.32	2.22
Units	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)
PARAMETERS										
TPH-g	1,700,000	<250	<250	<240	<230	<260	<230	<230	<240	<230
TPH-d (TO-17)	440,000	<10,000*	<10,000*	<10,000*	<10,000*	<10,000*	<10,000*	<10,000*	<10,000*	<10,000*
Freon 12	--	<6.0	<6.0	<5.9	<5.6	<6.2	<5.6	<5.5	<5.7	<5.5
Freon 114	--	<8.4	<8.5	<8.3	<7.9	<8.8	<8.0	<7.8	<8.1	<7.8
Chloromethane	390,000	<25	<25	<24	<23	<26	<24	<23	<24	<23
Vinyl Chloride	2,800	<3.1	<3.1	<3.0	<2.9	<3.2	<2.9	<2.8	<3.0	<2.8
1,3-Butadiene	--	<2.7	<2.7	<2.6	<2.5	<2.8	<2.5	<2.5	<2.6	<2.4
Bromomethane	22,000	<47	<47	<46	<44	<49	<44	<43	<45	<43
Chloroethane	44,000,000	<13	<13	<12	<12	<13	<12	<12	<12	<12
Freon 11	3,100,000	<6.8	<6.8	<6.6	<6.3	<7.1	<6.4	<6.3	<6.5	<6.2
Ethanol	--	<9.1	<9.2	<8.9	13	29	14	21	9.8	<8.4
Freon 113	130,000,000	<9.3	<9.4	<9.1	<8.7	<9.6	<8.7	<8.5	<8.9	<8.5
1,1-Dichloroethene	880,000	<4.8	<4.8	<4.7	<4.5	<5.0	<4.5	<4.4	<4.6	<4.4
Acetone	--	50	<29	<28	54	<30	32	<26	30	<26
2-Propanol	--	<12	46	<12	<11	<12	<11	<11	<11	<11
Carbon Disulfide	--	<15	<15	<15	<14	<16	<14	<14	<14	<14
3-Chloropropene	--	<15	<15	<15	<14	<16	<14	<14	<14	<14
Methylene Chloride	--	<42	<42	<41	<39	<44	<40	<39	<40	<38
Methyl tert-butyl ether	47,000	<4.4	<4.4	<4.3	<4.1	<4.5	<4.1	<4.0	<4.2	<4.0
trans-1,2-Dichloroethene	260,000	<4.8	<4.8	<4.7	<4.5	<5.0	<4.5	<4.4	<4.6	<4.4
Hexane	--	<4.3	<4.3	<4.2	<4.0	<4.4	<4.0	<3.9	<4.1	<3.9
1,1-Dichloroethane	7,700	<4.9	<4.9	<4.8	<4.6	<5.1	<4.6	<4.5	<4.7	<4.5
2-Butanone (Methyl Ethyl Ketone)	--	<14	<14	<14	<13	<15	<13	<13	<14	<13
cis-1,2-Dichloroethene	--	<4.8	<4.8	<4.7	<4.5	<5.0	<4.5	<4.4	<4.6	<4.4
Tetrahydrofuran	--	<3.6	<3.6	<3.5	<3.3	<3.7	<3.4	<3.3	<3.4	<3.3
Chloroform	530	<5.9	<6.0	<5.8	<5.5	<6.2	<5.6	<5.4	<5.7	<5.4
1,1,1-Trichloroethane	22,000,000	<6.6	<6.6	<6.5	<6.2	<6.9	<6.2	<6.1	<6.3	<6.0
Cyclohexane	--	<4.2	<4.2	<4.1	<3.9	<4.3	<3.9	<3.8	<4.0	<3.8
Carbon Tetrachloride	2,000	<7.6	<7.7	<7.4	<7.1	<7.9	<7.2	<7.0	<7.3	<7.0
2,2,4-Trimethylpentane	--	<5.6	<5.7	<5.5	<5.3	<5.9	<5.3	<5.2	<5.4	<5.2
Benzene	1,600	<3.9	<3.9	<3.8	<3.6	<4.0	<3.6	<3.6	<3.7	<3.5
1,2-Dichloroethane	470	<4.9	<4.9	<4.8	<4.6	<5.1	<4.6	<4.5	<4.7	<4.5
Heptane	--	<5.0	<5.0	<4.8	<4.6	<5.2	<4.7	<4.6	<4.8	<4.5
Trichloroethene	2,900	<6.5	<6.6	<6.4	<6.1	<6.8	<6.1	<6.0	<6.2	<6.0
1,2-Dichloropropane	--	<5.6	<5.6	<5.5	<5.2	<5.8	<5.3	<5.2	<5.4	<5.1
1,4-Dioxane	--	<17	<18	<17	<16	<18	<16	<16	<17	<16
Bromodichloromethane	330	<8.1	<8.2	<7.9	<7.6	<8.4	<7.6	<7.5	<7.8	<7.4
cis-1,3-Dichloropropene	--	<5.5	<5.5	<5.4	<5.1	<5.7	<5.2	<5.1	<5.3	<5.0
4-Methyl-2-pentanone	--	<5.0	<5.0	<4.8	<4.6	<5.2	<4.7	<4.6	<4.8	<4.5

TABLE 4
SOIL GAS ANALYTICAL RESULTS – VOCs
SUB-SLAB SOIL VAPOR INVESTIGATION REPORT
PHILLIPS 66 PORTLAND TERMINAL, CHEVRON SITE NO. 354972
5528 NW DOANE AVE., PORTLAND, OREGON
DEQ ECSI NO. 177

Sample ID	DEQ Soil Gas RBC	SSVP-1	SSVP-2	SSVP-2 Dup	SSVP-3	SSVP-4	SSVP-5	SSVP-6	SSVP-7	EB-1
Sample Date	Vapor Intrusion into Buildings	12/05/14	12/05/14	12/05/14	12/04/14	12/04/14	12/04/14	12/04/14	12/04/14	12/05/14
Dilution Factor	Occupational	2.42	2.44	2.37	2.26	2.52	2.28	2.23	2.32	2.22
Units	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)
PARAMETERS										
Toluene	22,000,000	<4.6	<4.6	<4.5	<4.2	<4.7	5.2	10	<4.4	<4.2
trans-1,3-Dichloropropene	--	<5.5	<5.5	<5.4	<5.1	<5.7	<5.2	<5.1	<5.3	<5.0
1,1,2-Trichloroethane	770	<6.6	<6.6	<6.5	<6.2	<6.9	<6.2	<6.1	<6.3	<6.0
Tetrachloroethene	47,000	<8.2	<8.3	<8.0	<7.7	<8.5	<7.7	<7.6	<7.9	<7.5
2-Hexanone	--	<20	<20	<19	<18	<21	<19	<18	<19	<18
Dibromochloromethane	--	<10	<10	<10	<9.6	<11	<9.7	<9.5	<9.9	<9.4
1,2-Dibromoethane (EDB)	--	<9.3	<9.4	<9.1	<8.7	<9.7	<8.8	<8.6	<8.9	<8.5
Chlorobenzene	220,000	<5.6	<5.6	<5.4	<5.2	<5.8	<5.2	<5.1	<5.3	<5.1
Ethyl Benzene	4,900	<5.2	<5.3	<5.1	<4.9	<5.5	<4.9	<4.8	<5.0	<4.8
m,p-Xylene	440,000	<5.2	<5.3	<5.1	<4.9	<5.5	<5.0	<4.8	<5.0	<4.8
o-Xylene	440,000	<5.2	<5.3	<5.1	<4.9	<5.5	<5.0	<4.8	<5.0	<4.8
Styrene	4,400,000	<5.2	<5.2	<5.0	<4.8	<5.4	<4.8	<4.7	<4.9	<4.7
Bromoform	11,000	<12	<13	<12	<12	<13	<12	<12	<12	<11
Cumene	1,800,000	<5.9	<6.0	<5.8	<5.6	<6.2	<5.6	<5.5	<5.7	<5.4
1,1,2,2-Tetrachloroethane	--	<8.3	<8.4	<8.1	<7.8	<8.6	<7.8	<7.6	<8.0	<7.6
Propylbenzene	--	<5.9	<6.0	<5.8	<5.6	<6.2	<5.6	<5.5	<5.7	<5.4
4-Ethyltoluene	--	<5.9	<6.0	<5.8	<5.6	<6.2	<5.6	<5.5	<5.7	<5.4
1,3,5-Trimethylbenzene	--	<5.9	<6.0	<5.8	<5.6	<6.2	<5.6	<5.5	<5.7	<5.4
1,2,4-Trimethylbenzene	31,000	<5.9	<6.0	<5.8	<5.6	<6.2	<5.6	<5.5	<5.7	<5.4
1,3-Dichlorobenzene	--	<7.3	<7.3	<7.1	<6.8	<7.6	<6.8	<6.7	<7.0	<6.7
1,4-Dichlorobenzene	1,100	<7.3	<7.3	<7.1	<6.8	<7.6	<6.8	<6.7	<7.0	<6.7
alpha-Chlorotoluene	--	<6.3	<6.3	<6.1	<5.8	<6.5	<5.9	<5.8	<6.0	<5.7
1,2-Dichlorobenzene	880,000	<7.3	<7.3	<7.1	<6.8	<7.6	<6.8	<6.7	<7.0	<6.7
1,2,4-Trichlorobenzene	--	<36	<36	<35	<34	<37	<34	<33	<34	<33
Hexachlorobutadiene	--	<52	<52	<50	<48	<54	<49	<48	<49	<47
Naphthalene	360	<25	<26	<25	<24	<26	<24	<23	<24	<23

Notes:

Bolded values indicate detections at or above the method reporting limit.

Dup = Blind duplicate sample

EB-1 = Equipment blank sample

<6.0 = Not detected above the laboratory method reporting limit (MRL) of 6.0 µg/m3

VOCs = volatile organic compounds

TPH-g and VOCs analyzed by US Environmental Protection Agency Method TO-15 .

TPH-d analyzed by US Environmental Protection Agency Method TO-17 .

µg/m³ = micrograms per cubic meter

DEQ = Oregon Department of Environmental Quality

RBC = Risk-Based Concentrations

* = A dilution factor of 1.00 applies to TPH-d results

TABLE 5
 SOIL GAS ANALYTICAL RESULTS – FIXED GASES
 SUB-SLAB SOIL VAPOR INVESTIGATION REPORT
 PHILLIPS 66 PORTLAND TERMINAL, CHEVRON SITE NO. 354972
 5528 NW DOANE AVE., PORTLAND, OREGON
 DEQ ECSI NO. 177

Sample ID	SSVP-1	SSVP-2	SSVP-2 Dup	SSVP-3	SSVP-4	SSVP-5	SSVP-6	SSVP-7	EB-1
Sample Date	12/05/14	12/05/14	12/05/14	12/04/14	12/04/14	12/04/14	12/04/14	12/04/14	12/05/14
Dilution Factor	2.42	2.44	2.37	2.26	2.52	2.28	2.23	2.32	2.22
Units	% by vol	% by vol	% by vol	% by vol	% by vol	% by vol	% by vol	% by vol	% by vol
PARAMETERS									
Oxygen	16	17	17	13	17	14	15	20	0.63
Methane	<0.00024	<0.00024	<0.00023	<0.00023	<0.00025	<0.00023	<0.00022	<0.00023	<0.00022
Carbon Dioxide	2.8	2.2	2.2	4.9	2.2	5.7	3.2	0.15	<0.022
Helium	<0.12	<0.12	<0.11	<0.11	<0.13	<0.11	<0.11	<0.12	<0.11

Notes:

Dup = Blind duplicate sample

EB-1 = Equipment blank sample

Bolded values indicate detections at or above the method reporting limit.

<0.00024 = Not detected above the laboratory method reporting limit (MRL) of <0.00024%

DEQ = Oregon Department of Environmental Quality

ECSI = Environmental Cleanup Site Investigation



Appendix A

Vapor Intrusion Screening
Presentation

Phillips 66 Portland Terminal Vapor Intrusion Screening



Prepared For:
Mr. Mike Romero
Oregon DEQ

Prepared By:
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Mr. Grant V. Sprick, PE
ARCADIS U.S., Inc.

Prepared on Behalf of:
**Chevron Environmental Management Company's
affiliate, Union Oil Company of California**

May 14, 2014



Site Location



Vapor Intrusion Screening Outline



- § Objectives and Drivers
- § Focused Conceptual Site Model
- § Building Use Assessment
- § Review of Historical Releases
- § Overview of Available Datasets
- § Groundwater Screening
- § Data Gap Analysis
- § Proposed Sub-Slab Soil Vapor Investigation
- § Next Steps
- § Appendix A

Objectives and Drivers



§ Objectives

- Screen existing analytical data against relevant VI RBCs
- Identify data gaps
- Propose and collect soil vapor samples to fill data gaps
- Identify occupied buildings and evaluate vapor risk in these locations

§ Drivers

- Vapor intrusion (VI) risks have not been assessed site-wide

Focused Conceptual Site Model



- § Historical releases have impacted soils and groundwater at the site
 - Potential for volatile constituents to lead to vapor intrusion problems at occupied buildings on the site
 - Volatilization to outdoor air is considered insignificant
 - Active petroleum terminal
- § Many site buildings are not occupied and are used intermittently
 - Do not pose significant risks from vapor intrusion
 - Occupied buildings defined and screened in this assessment

Vapor Intrusion Guidance – Buildings



- § Screen soil, groundwater, and soil vapor data within 100 feet of buildings
- § Site contains small buildings with temporary work areas, not occupied full-time by workers
- § “Occupied buildings” not defined by guidance
 - RBCs assess occupational risk based on 8 hrs/day, 250 days/yr
- § For this assessment, buildings with 1 full-time employee equivalent were considered “occupied”
 - Average of 8+ hrs of occupancy per weekday
- § Evaluation is based on current and anticipated likely future use of existing buildings

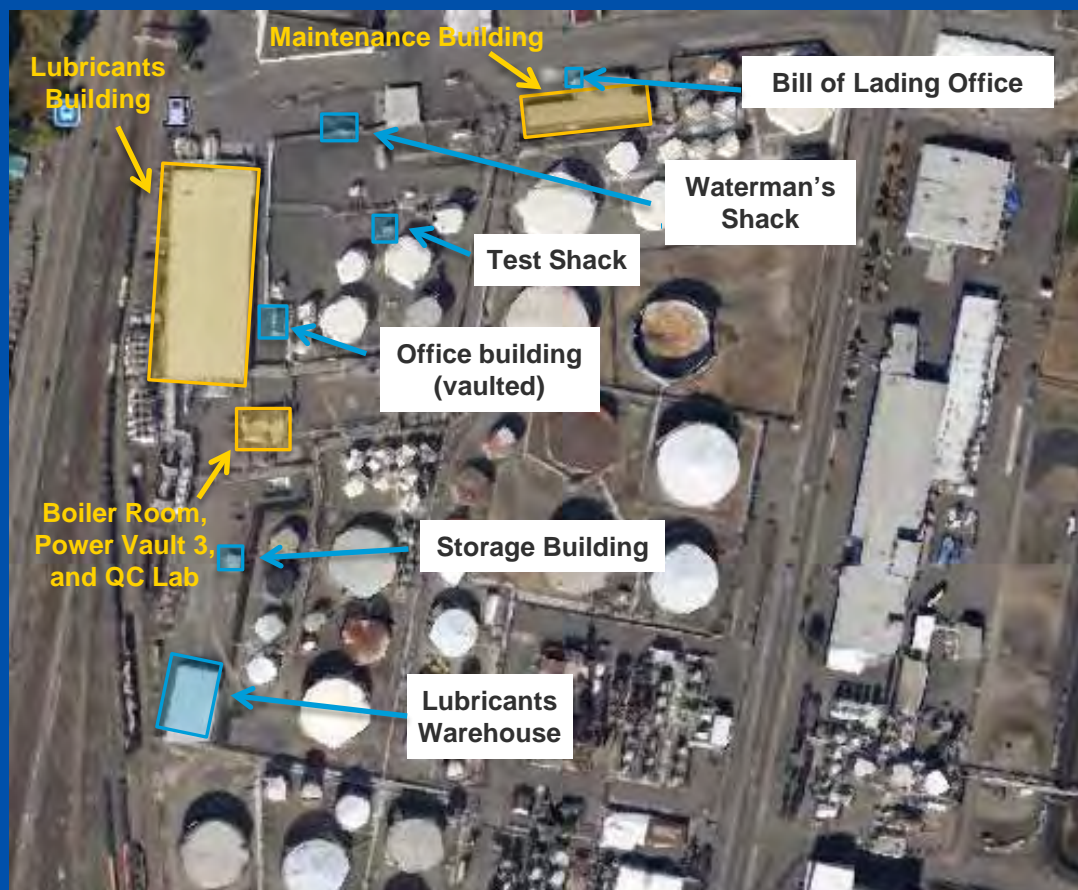
Occupied Buildings



= occupied buildings



= unoccupied buildings



§ Lubricants Building

- First floor offices

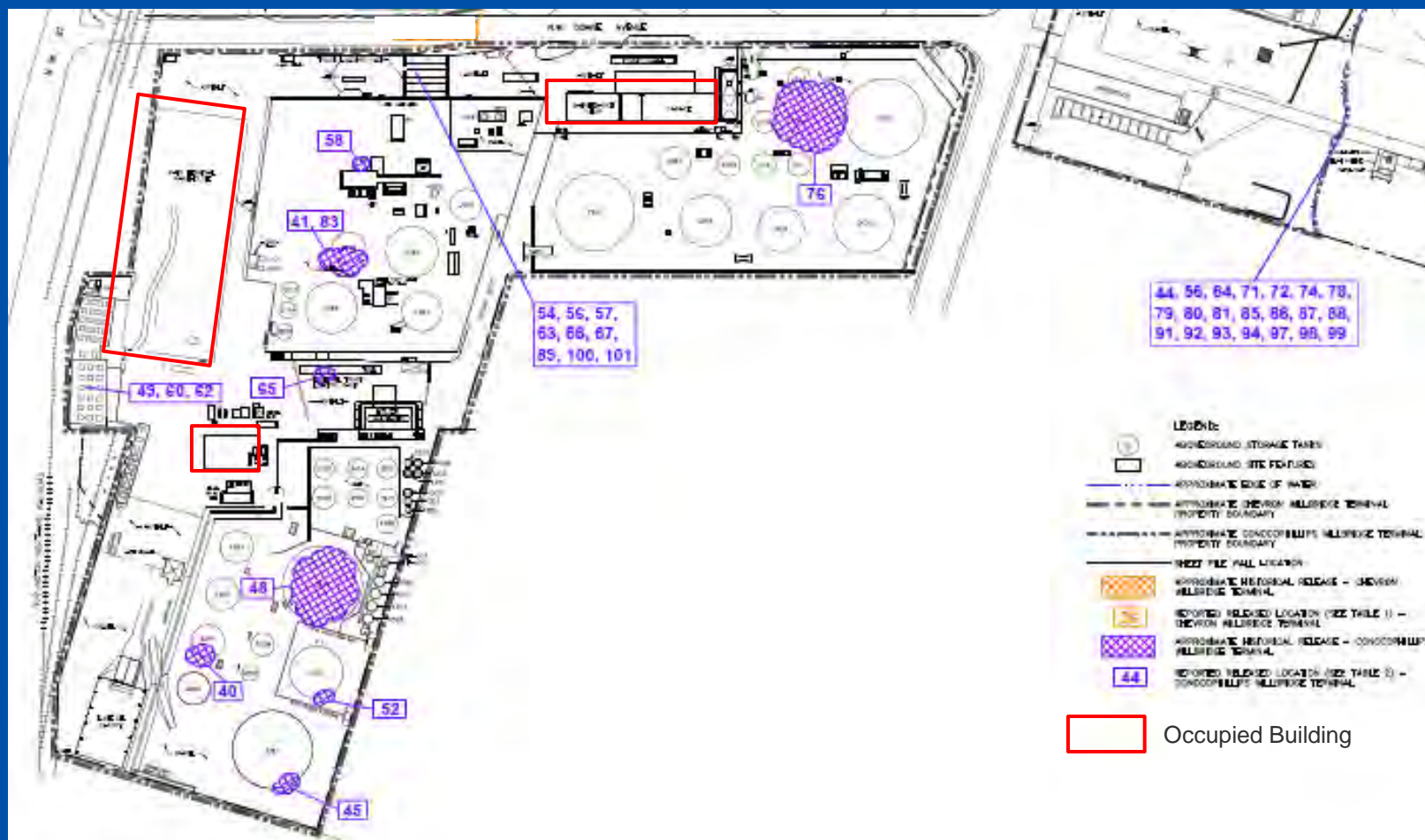
§ Maintenance Building

- Two offices, terminal sign-in office temporarily occupied by contractors daily.

§ Boiler Room, Power Vault 3, and QC Lab

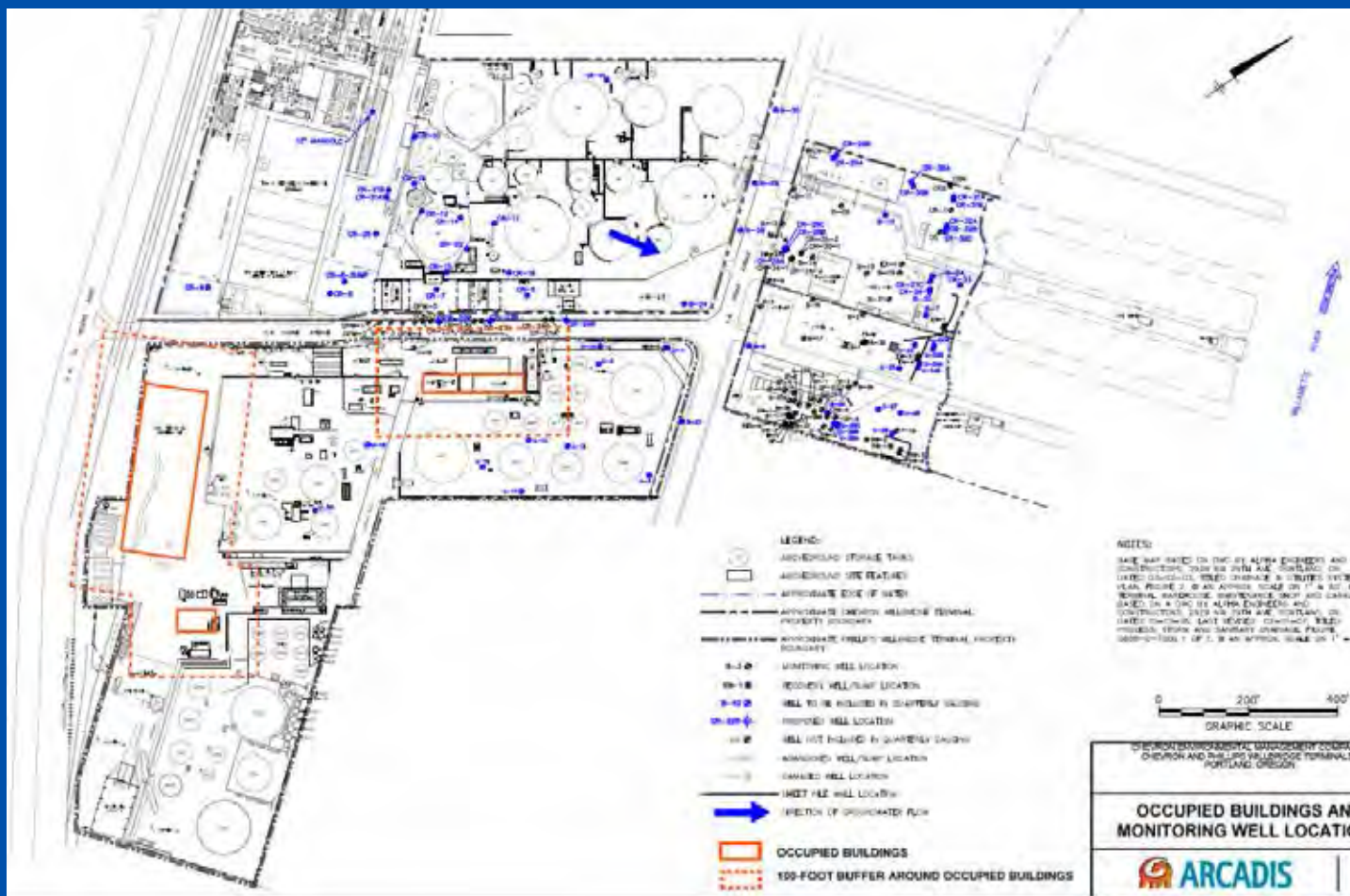
- Occupied by approx 1 person 5-10 hrs/day, 5 days/wk

Historical Site Releases



*The extent of surface impacts have been approximated based on the volume of release. Refer to Appendix A for complete figure and summary table of numbered releases.

100-Foot Around Occupied Buildings



Overview of Available Datasets



§ Soil

- DEQ considers soil data a poor screening tool for assessing VI risk when other data are available. The locations of reported spills were used as a proxy for likely soil impacts.
 - One spill, the release from Tank 3411 in 1997, emanated from a location approximately 80 to 100-feet from the Maintenance Building.

§ Groundwater

- All available groundwater analytical data (2000 – present)
 - Most recent available data was from 1st quarter 2013
 - Screened against Groundwater Vapor Intrusion into Buildings RBC (RBCwi) for Occupational Receptor exposure pathway
 - No detection limits exceed RBCwi
- Shallow zone wells within 100 ft of occupied buildings

Overview of Available Datasets (continued)



§ Soil Vapor

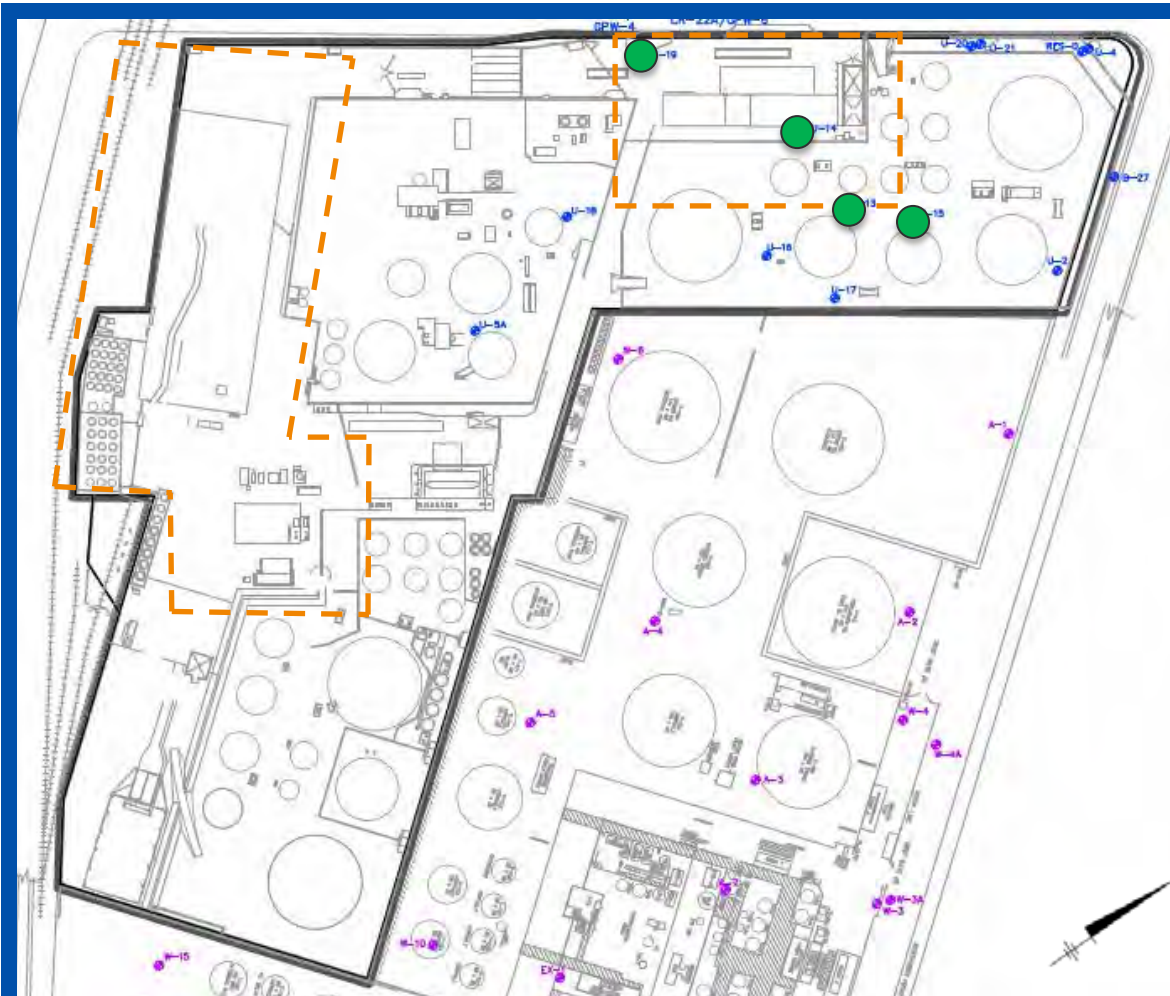
- No historical data available

§ Ambient Air

- No historical data available

Groundwater Screening against RBCs

Complete Historical Data



Legend

- RBC exceedance or SPH Present
- No data available
- Data available, no RBC exceedances
- 100-foot buffer around occupied buildings

Summary of Groundwater Screening Findings



- § No recent or historical exceedances of Groundwater Vapor Intrusion into Buildings RBC (RBCwi) in wells within 100 feet of the maintenance building
 - Only two well locations within 100 feet of the maintenance building, thus insufficient data to determine vapor intrusion risk
 - No wells located within 100 feet of Lubricants building or Lab QC Room
- § Insufficient data available in areas within 100 feet of occupied buildings
- § Vapor intrusion risk in this area can not be adequately evaluated with the existing dataset

Data Gap Analysis



- § Three occupied buildings are located in areas with insufficient data to evaluate potential vapor risk:
- Lubricants Building
 - Maintenance Building
 - QC Lab room in Boiler Room/Power Vault 3

Proposed Soil Vapor Investigation



§ Sub-slab sampling in occupied buildings

– DEQ VI Guidance:

Table 2: Sampling Density in Commercial Buildings

Building Size	Sample Density	Minimum Number of Samples
Less than 1,000 ft ²	NA*	2
1,000 ft ² -10,000 ft ²	One per 1,500 ft ²	3
Greater than 10,000 ft ²	One per 2,500 ft ² , or as otherwise determined through consultation with DEQ	7

*NA = Not Applicable

- Reduced sampling density per guidance Table 1
 - „ Large scale site and building (Maintenance & Lubricants buildings)
 - „ Reconnaissance sampling – not in response to particular source

Proposed Soil Vapor Investigation



§ BTEX is the risk-driver in the subsurface at the site

- BTEX have been detected in groundwater in site wells above relevant RBCs

§ Sub-slab soil gas sample analyses

- BTEX
- Fixed gases (O_2 , CO_2 , CH_4 , He [tracer])

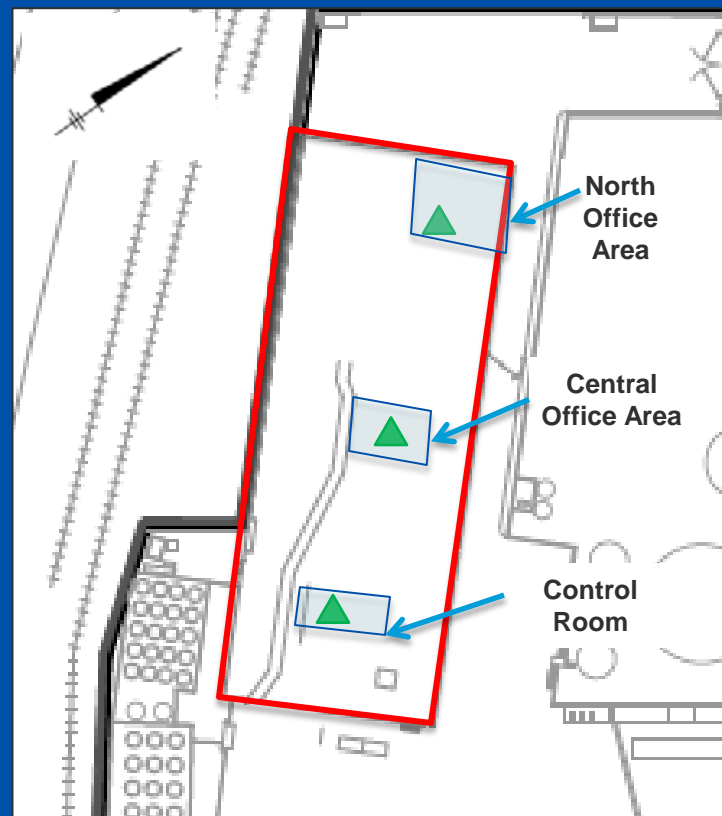
Lubricants Building Sub-slab Sampling



§ Approximately 46,000 sq. ft. building; 3 primary occupied areas, 3 samples

- 1 in north office area
- 1 in central office area
- 1 in control room

▲ = Proposed sub-slab sampling location

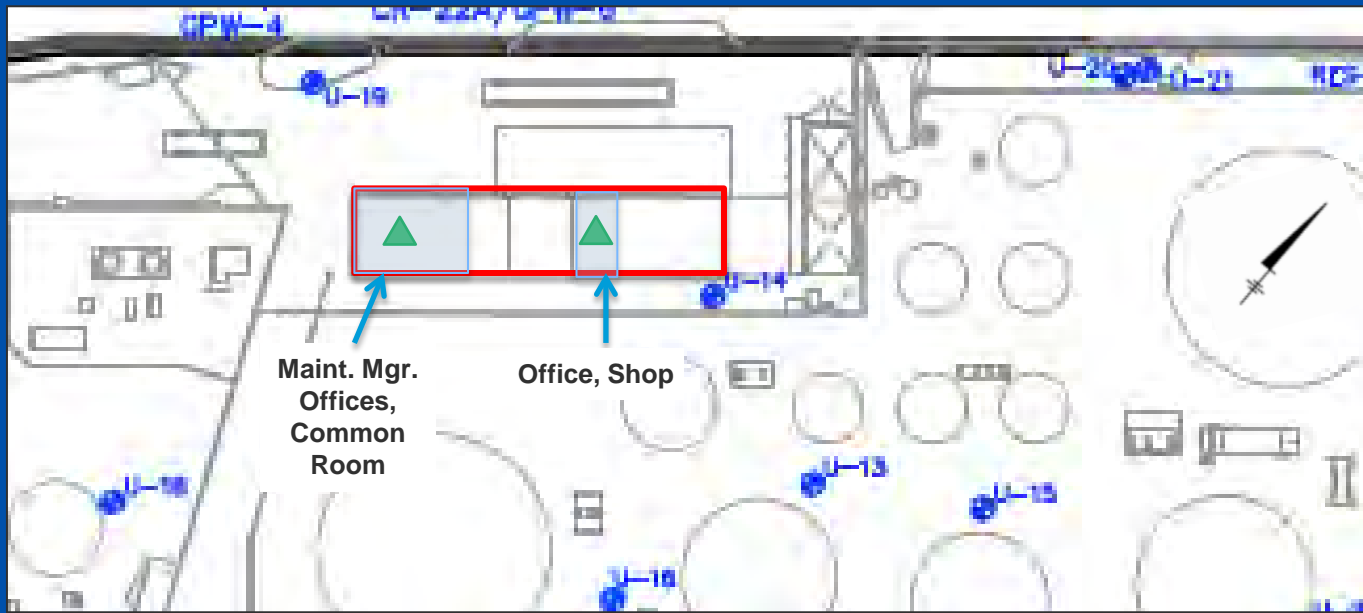


Maintenance Building Sub-slab Sampling



▲ = Proposed sub-slab sampling location

- § Approximately 6,000 sq. ft. occupied building, 2 samples
- 1 in main work area, 1 in office

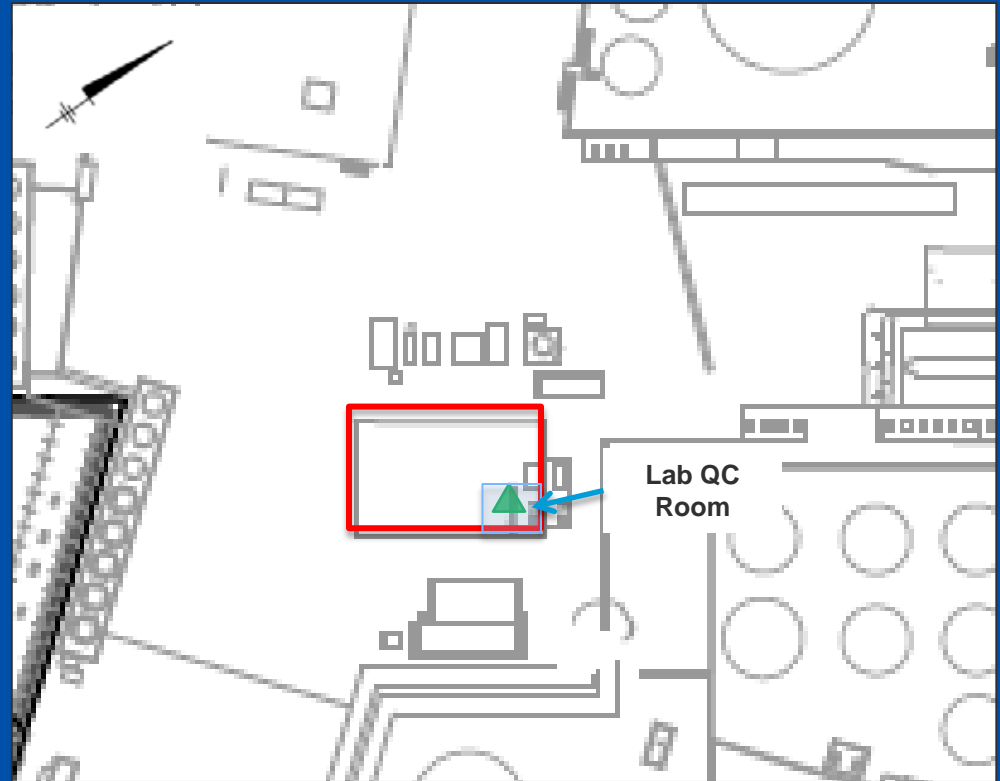


QC Lab Sub-slab Sampling



- § Approximately 3,900 sq. ft. building,
only 500 sq. ft. of which is occupied
 - 1 sample

▲ = Proposed sub-slab sampling location



Next Steps



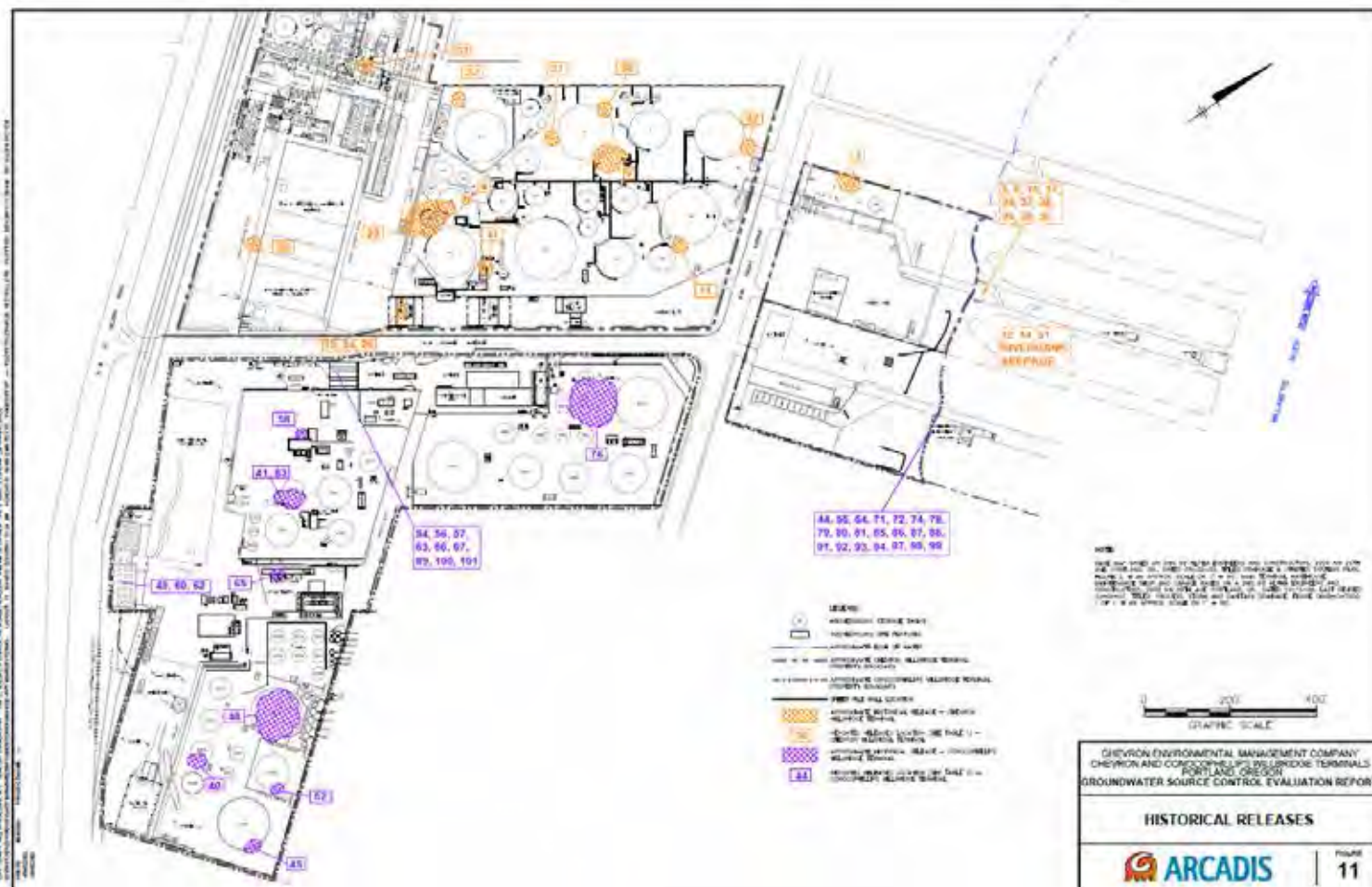
- § Obtain concurrence from DEQ, making revisions to plan as needed
- § Submit a Work Plan to DEQ
- § Summarize the investigation and results of the vapor evaluation in a report submitted to DEQ, which will present recommendations for a path forward based on the results of the investigation

Appendix A



- § Figure of Historical Releases
- § Summary Table of Releases at Phillips Terminal
- § Logistics: Photographs and Schematic of a Sub-Slab Probe

Historical Releases



Summary Table of Historical Releases – Phillips 66



TABLE 2
HISTORICAL RELEASES – CONOCOPHILLIPS WILLBRIDGE TERMINAL

GROUNDWATER SOURCE CONTROL EVALUATION
WILLBRIDGE TERMINAL FACILITY NO. 1001868 and 354972
PORTLAND, OREGON

Spill Number ^a	Date	Location	Volume (gallons)	Product	Comments ^b
39	01/21/79	Unspecified	8,500	Leaded regular gasoline	Failure of filter check valve. Contained in separator system; approximately 100 gallons may have entered sanitary sewer.
40	04/28/81	Tank 4254	100	Asphalt	Tank leak
41	08/10/81	Tank 2689	310	RR-40	Tank overflow
42	06/22/82	Unspecified	127	RR-40	Tank overflow of underground flush tank.
43	07/18/82	Unspecified	800	ATF	Product line cracked during annual pressure test.
44	07/19/82	ConocoPhillips Marine Dock Area	1,000	Diesel	Line "blow out"
45	01/25/83	Tank 3781	20	Diesel	Tank leak
46	05/01/85	Unspecified	15	NA	Tank overflow
47	05/30/85	Tank 4388	370	Unknown	Tank overflow
48	06/11/85	Pipeline beneath NW Front Avenue: 10-inch pipeline from tank 3579.	3,000	Fuel oil	Leak at broken flange gasket
49	07/29/85	Rail car loading and unloading area	20	Oil	Release flowed into sump drain
50	08/09/85	Tank 1209	40	Fuel additive S-13	Tank overflow
51	03/14/86	Tank F-11	10	Fuel additive	NA
52	03/14/86	Tank 4310	42	Asphalt (APC-400W)	Leaked from metering system
53	08/19/86	Unspecified	200	Oil (#50 Neutral)	Rupture of heating vessel

TABLE 2
HISTORICAL RELEASES – CONOCOPHILLIPS WILLBRIDGE TERMINAL

GROUNDWATER SOURCE CONTROL EVALUATION
WILLBRIDGE TERMINAL FACILITY NO. 1001868 and 354972
PORTLAND, OREGON

Spill Number ^a	Date	Location	Volume (gallons)	Product	Comments ^b
54	09/20/86	Electric steam pumps behind loading rack; Tank Farm #1	84	Fuel oil	Leaked from pump
55	01/26/87	Unspecified	70	Additive R-12F	Leaked from circulation pump
56	01/28/87	Marine Dock Area	10	NA	Product spilled while disconnecting fuel hose from vessel
57	04/15/88	Loading rack	1,300	Diesel	Fully contained
58	NA/0/89	Tank 36	50	Fuel oil	Drain overflowed
59	05/18/89	Electric steam pumps behind loading rack; Tank Farm #1	40	Diesel #2	Driver overfilled fueling tank (contained)
60	07/16/89	Tank car loading area	300	Acryloid	Contained
61	11/24/89	Unspecified	210	Fuel oil	Spilled onto ground from a steam pump
62	12/17/89	Rail car loading area	10	RR-40	Steam coil leaked (contained)
63	04/26/90	Loading rack	72	Unleaded gasoline	Equipment malfunction (contained)
64	07/04/90	ConocoPhillips Marine Dock Area	1	NA	Leaking gasket on abandoned asphalt line on dock
65	08/23/90	Lubricant oil loading rack	10	Gear lube	Overflowed truck (contained)
66	09/13/90	Loading rack	10	Regular leaded gasoline	Spring valve failed (contained)
67	05/06/91	Loading rack	50	Unleaded gasoline	Float failed (contained)
68	09/30/91	Unspecified	3	Oil additive	Bleeder valve vibrated open

Summary Table of Historical Releases – Phillips 66



TABLE 2
HISTORICAL RELEASES – CONOCOPHILLIPS WILLBRIDGE TERMINAL

GROUNDWATER SOURCE CONTROL EVALUATION
WILLBRIDGE TERMINAL FACILITY NO. 1001868 and 354972
PORTLAND, OREGON

Spill Number ^a	Date	Location	Volume (gallons)	Product	Comments ^a
68	06/04/92	Unspecified	50	Flush oil	Overflowed from underground flush tank (separator contained)
70	03/08/93	Unspecified	2,900	Lubricant oil Ramar 20140	Overflowed (separator contained)
71	07/16/93	Marine Dock Area	2	Fuel oil #2	Leak in tank on barge
72	06/20/94	Marine Dock Area	10	Cutter oil	Release during transfer, faulty gasket
73	10/26/94	Unspecified	4,000	Unleaded gasoline	Pipeline pump valve failure
74	11/08/94	Marine Dock Area	4	Bunker fuel	Line failure during test
75	11/02/95	Unspecified	5,000	Black oil	Malfunctioned pump
76	02/22/97	Tank 3411	11,700	Unleaded gasoline	Overfilled tank 3411
77	12/18/97	Unspecified	2,500	Lube oil	Equipment failure at barrel filler, next to warehouse
78	11/03/98	ConocoPhillips Marine Dock Area	1	Fuel oil #2	Release during transfer
79	12/24/98	ConocoPhillips Marine Dock Area	5	Unleaded gasoline	Frozen pipe ruptured
80	02/10/99	ConocoPhillips Marine Dock Area	3	Diesel fuel	Release during transfer
81	11/02/99	ConocoPhillips Marine Dock Area	1	Diesel fuel	Release during transfer
82	06/15/00	Tank 2982	6,540	Kerosene	Equipment malfunction (sampling valve vibrated open)
83	12/21/00	Tank 2669	55	Marine diesel oil	Pinhole in tank
84	01/24/01	Unspecified	55	Diesel fuel	Release at tank
85	01/31/01	ConocoPhillips Marine Dock Area	1	Cutter oil	Release to river
86	03/26/01	ConocoPhillips Marine Dock Area	1	Diesel fuel	Release during transfer
87	06/20/01	ConocoPhillips Marine Dock Area	25	Marine diesel oil	Impacted soil above buried pipeline
88	09/28/01	ConocoPhillips Marine Dock Area	1	Unknown	Release during transfer

TABLE 2
HISTORICAL RELEASES – CONOCOPHILLIPS WILLBRIDGE TERMINAL

GROUNDWATER SOURCE CONTROL EVALUATION
WILLBRIDGE TERMINAL FACILITY NO. 1001868 and 354972
PORTLAND, OREGON

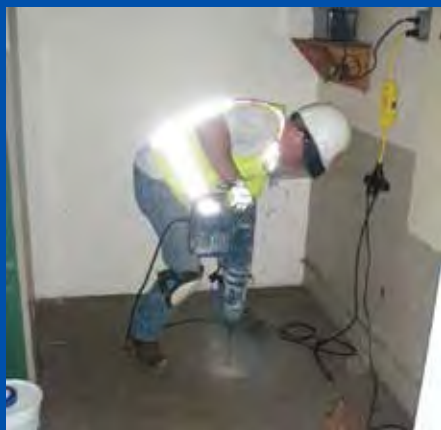
Spill Number ^a	Date	Location	Volume (gallons)	Product	Comments ^a
89	02/02/02	Loading rack	100	Unleaded gasoline	Spill during filling
90	07/31/02	Unspecified	50	Oil	Release from relief valve
91	09/29/02	ConocoPhillips Marine Dock Area	1	Unknown	Shewn on river
92	10/15/02	ConocoPhillips Marine Dock Area	1	Marine diesel oil	Release during transfer
93	03/27/03	ConocoPhillips Marine Dock Area	1	Unknown	Shewn on river
94	08/13/03	ConocoPhillips Marine Dock Area	0.25	Unknown	Release during transfer
95	12/30/03	Unspecified	15	Diesel fuel	Release from tanker truck
96	08/28/04	Unspecified	40	Base oil	Relief valve failure
97	10/27/04	ConocoPhillips Marine Dock Area	200	Residual fuel	Release during transfer
98	09/10/05	ConocoPhillips Marine Dock Area	0.25	Fuel oil #2	Release during transfer
99	08/19/05	ConocoPhillips Marine Dock Area		Black oil	Potential release to river
100	05/19/06	Loading rack	15	Unknown	Release from tanker truck
101	01/29/07	Loading rack	1	Diesel fuel	Release from tanker truck
Total			50,052		

Notes:

^a Spill number correlates to Figure 3. Shaded rows denote those where specific locations could not be determined.

Logistics

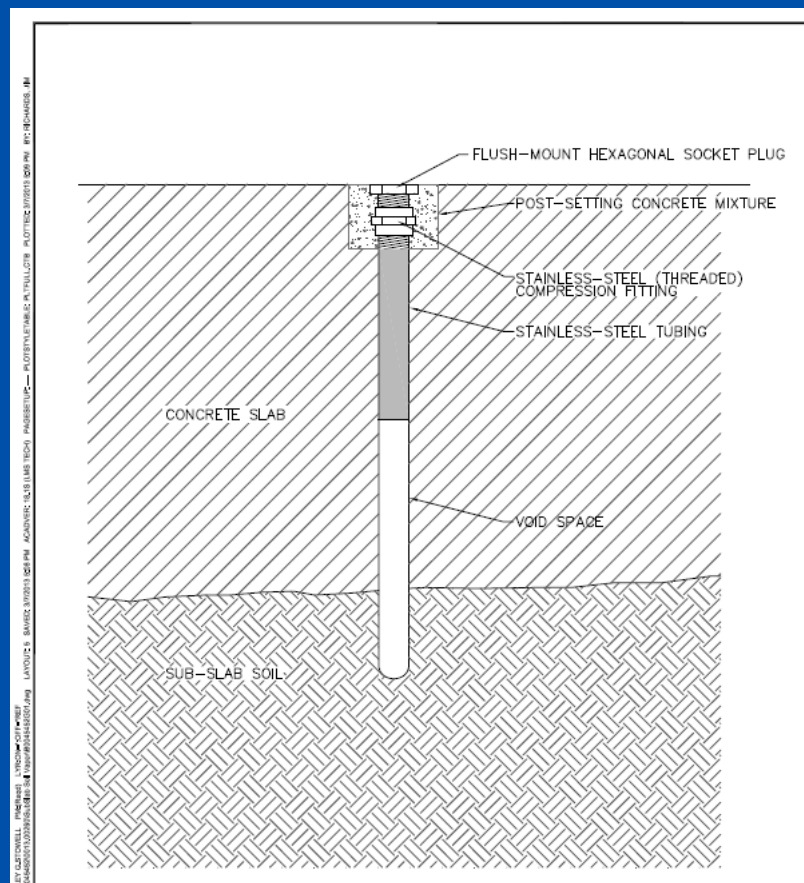
Photographs and Schematic of a Sub-Slab Probe



Installation with hammer drill



Probe at ground surface; blue cap is ~1/2" diameter

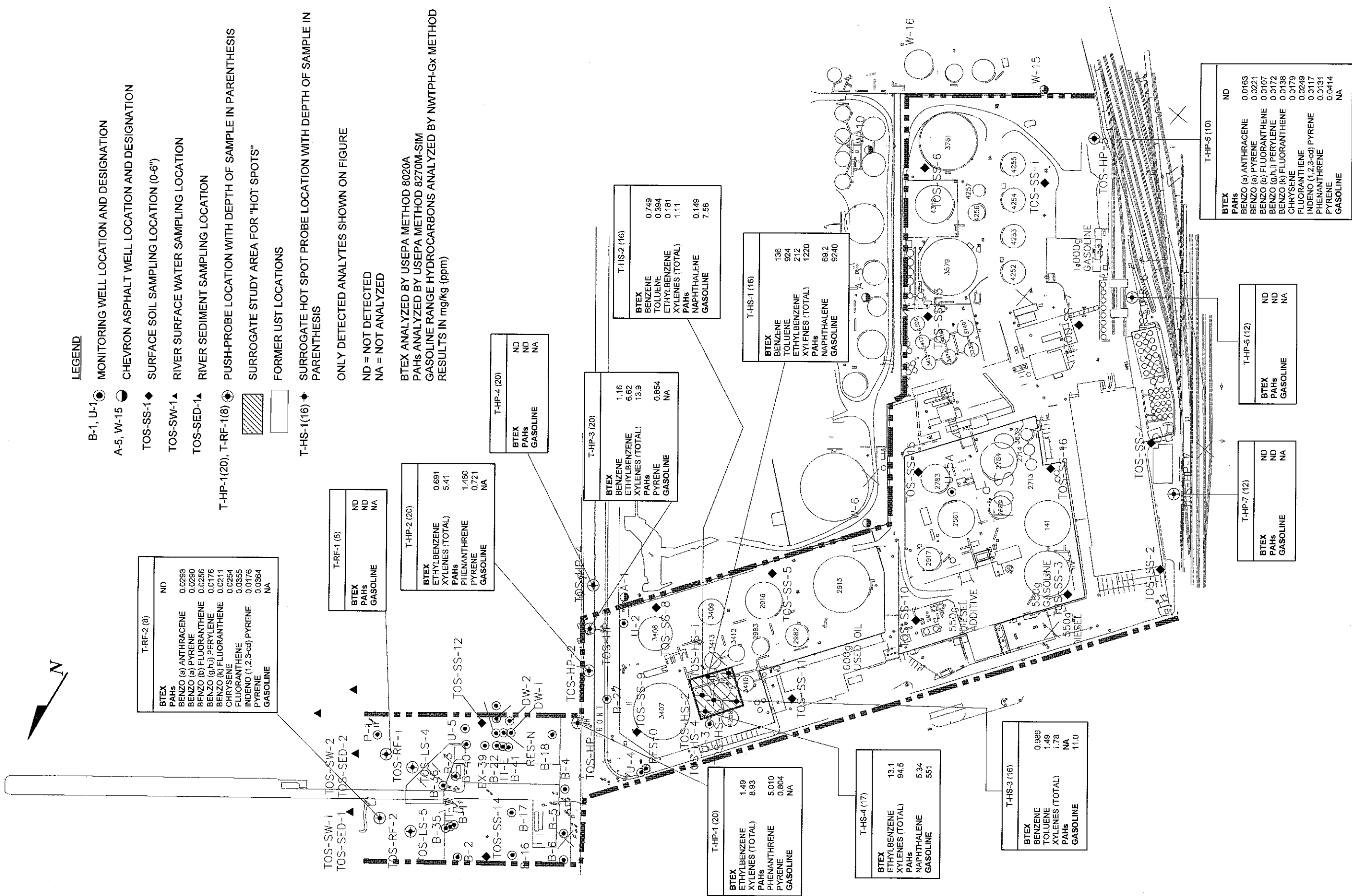


Schematic of Probe Construction



Appendix B

Summary of Soil Analytical Data from
the *Final Upland Remedial*
Investigation Report (KHM 2003)







Appendix C

Standard Operating Procedure:
Soil-Gas Sampling and Analysis
Using USEPA Method TO-17 and
TO-15


Soil-Gas Sampling and Analysis Using USEPA Method TO-17 and TO-15

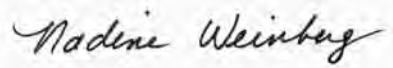
SOP #112409

Rev. #: 2

Rev Date: August 11, 2014

Approval Signatures

Prepared by:  Date: 8/11/2014
Mitch Wacksman, Eric Epple and Andrew Gutherz

Approved by:  Date: 8/11/2014
Nadine Weinberg

I. Scope and Application

This document describes the procedures to collect subsurface soil-gas samples from sub-slab sampling ports and soil vapor monitoring points for the analysis of volatile organic compounds (VOCs) including volatile polyaromatic hydrocarbons (PAHs) by United States Environmental Protection Agency (USEPA) Method TO-17 (TO-17) and USEPA Method TO-15.

The TO-17 method uses a glass or stainless steel tube packed with a sorbent material. Sorbents of increasing strength and composition are packed within the tube. The specific sorbent material packed within each tube is selected based on the target compounds and desired reporting limits. A measured volume of soil-gas is passed through the tube during sample collection.

The TO-15 method uses 1-liter 3-liter or 6-liter SUMMA® passivated stainless steel canister. An evacuated SUMMA canister (less than 28 inches of mercury [Hg]) will provide a recoverable whole-gas sample of approximately 5 liters when allowed to fill to a vacuum of approximately 6 inches of Hg. The whole-air sample is then analyzed for VOCs using a quadrupole or ion-trap gas chromatograph/mass spectrometer (GS/MS) system to provide compound detection limits of 0.5 parts per billion volume (ppbv). Optionally the canister sample can also be analyzed for fixed gasses such as Helium, Carbon dioxide and oxygen. .

Following sample collection the TO-17 tube and TO-15 canister is sent to the laboratory where the sampling media is analyzed for the target compounds.

The following sections list the necessary equipment and provide detailed instructions for the collection of soil-gas samples for analysis using TO-17 and TO-15.

Soil vapor samples can be collected from sub-slab sample probes or soil-vapor ports. Refer to the appropriate standard operating procedure (SOP) from the ARCADIS SOP library for a description of construction methods.

II. Personnel Qualifications

ARCADIS field sampling personnel will have current health and safety training, including 40-hour HAZWOPER training, site supervisor training, site-specific training, first-aid, and cardiopulmonary resuscitation (CPR), as needed. ARCADIS field sampling personnel will be well versed in the relevant standard operating procedures (SOPs) and possess the required skills and experience necessary to successfully complete the desired field work. ARCADIS personnel responsible for leading soil-gas sample collection activities must have previous soil-gas sampling experience.

III. Health and Safety Considerations

All sampling personnel should review the appropriate health and safety plan (HASP) and job loss analysis (JLA) prior to beginning work to be aware of all potential hazards associated with the job site and the specific task. Field sampling equipment must be carefully handled to minimize the potential for injury and the spread of hazardous substances. For sub-slab vapor probe installation, drilling with an electric concrete impact drill should be done only by personnel with prior experience using such a piece of equipment and with the appropriate health and safety measures in place as presented in the JLA

IV Equipment List

The equipment required for collect soil-gas samples for analysis using method TO-15 and TO-17 is presented below:

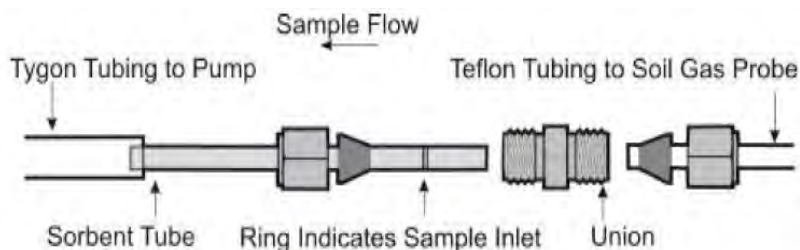
- Appropriate personal protective equipment (PPE; as presented in the site specific HASP and the JLA)
- TO-17 tubes pre-packed by the laboratory with the desired sorbent. Specific sorbents will be recommended by the laboratory considering the target compound list and the necessary reporting limits;
- TO-17 sample flow rate calibration tubes (provided by the laboratory);
- Stainless steel SUMMA[®] canisters (1-liter, 3-liter, or 6-liter; order at least 5% extra, if feasible) (batch certified canisters or individual certified canisters as required by the project)
- Flow controllers with in-line particulate filters and vacuum gauges; flow controllers are pre-calibrated to specified sample duration (e.g., 30 minutes, 8 hours, 24 hours) or flow rate (e.g., 200 milliliters per minute [mL/min]); confirm with the laboratory that the flow controller comes with an in-line particulate filter and pressure gauge (order at least 5% extra, if feasible). Flow rate should be selected based on expected soil type (see below).
- Two decontaminated Swagelok or stainless-steel or comparable two-way ball or needle valve (sized to match sample tubing).
- 1/4-inch outer diameter (OD) tubing (Teflon[®] or Teflon-lined polyethylene);
- Stainless steel or comparable Swagelok[®] or equivalent compression fittings for 1/4-inch OD tubing;

- Stainless steel “T” fitting (if sample train will be assembled with an inline vacuum gauge a four-way fitting will be needed);
- Three Stainless steel duplicate “T” fittings ;
- 2 Portable vacuum pumps capable of producing very low flow rates (e.g., 10 to 200 mL/min) with vacuum gauge;
- Vacuum gauge if monitoring vacuum reading during sample collection is necessary and portable vacuum pump is not equipped with a vacuum gauge;
- Rotameter or an electric flow sensor if vacuum pump does not have a flow gauge (Bios DryCal or equivalent);
- Tracer gas testing supplies (refer to Administering Tracer Gas SOP #41699);
- Photoionization Detector (PID) (with a lamp of 11.7 eV);
- Appropriate-sized open-end wrench (typically 9/16-inch, 1/2-inch , and 3/4-inch);
- 2 Tedlar bags;
- Portable weather meter, if appropriate;
- Chain-of-custody (COC) form;
- Sample collection log;
- Gel ice; and
- Field notebook.

V. Cautions

The following cautions and field tips should be reviewed and considered prior to collecting soil-gas samples.

- Sampling personnel should not handle hazardous substances (such as gasoline), permanent marking pens (sharpies), wear/apply fragrances, or smoke cigarettes/cigars before and/or during the sampling event.
- Care should be taken to ensure that the appropriate sorbent is used in the TO-17 tube preparation. Sorbent should be selected in consultation with the analytical laboratory and in consideration of the target compound list, the necessary reporting limits and the expected range of concentrations in field samples. The expected range of concentrations in field samples may be estimated from previous site data, release history and professional judgment informed by the conceptual site model.
- Flow rates for sample collection with TO-17 sorbent tubes should be determined well in advance of field work in consultation with the laboratory.
- Flow direction on the TO-17 sorbent tubes must be considered. Sorbent tubes are specifically designed to absorb lighter end compound at the influent side of the tube and heavier compounds toward the effluent side of the sorbent tube. Confirm flow direction with analytical laboratory or supplier. The picture below shows a ring indicator on a sorbent tube; this indicates the influent end of the sorbent tube. This ring may also hold labeling clips used to identify the sample. If removed during sample collection or to identify flow direction, remember to replace upon completion. An arrow indicating flow direction may also be printed on the sorbent tube.



- TO-17 sorbent tubes must be oriented vertically during sampling to ensure equal distribution of compounds along the sorbent media.
- A Shipping Determination must be performed, by DOT-trained personnel, for all environmental samples that are to be shipped, as well as some types of environmental equipment/supplies that are to be shipped.
- At the sampling location, keep the tubes in their storage and transportation container to equilibrate with ambient temperature prior to attaching to the sample train.

- Always use clean gloves when handling sampling tubes.
- Seal clean, blank sorbent tubes and sampled tubes using inert, Swagelok®-type fittings and PTFE ferrules. Wrap capped tubes individually in uncoated aluminum foil. Use clean, sealable glass jars or metal cans containing a small packet of activated charcoal or activated charcoal/silica gel for storage and transportation of multiple tubes. This activated charcoal is not analyzed, but serves as a protection for the analytical sorbent tube. Store the multi-tube storage container in a clean environment at 4°C.
- Keep the sample tubes inside the storage container during transportation and only remove them at the monitoring location after the tubes have reached ambient temperature. Store sampled tubes in a refrigerator at 4°C inside the multi-tube container until ready for analysis.
- The purge flow rate of 100 ml/min should be suitable for a variety of silt and sand conditions but will not be achievable in some clays without excessive vacuum. A low vacuum (<10" of mercury) should be maintained. Record the measured flow rate and vacuum pressure during sample collection.

The cutoff value for vacuum differs in the literature from 10" of water column (ITRC 2007) to 136" of water column or 10" of mercury (http://www.dtsc.ca.gov/lawsregspolicies/policies/SiteCleanup/upload/SMBR_ADV_activesoilgasinvst.pdf). A detailed discussion of the achievable flow rates in various permeability materials can be found in Nicholson 2007. Related issues of contaminant partitioning are summarized in ASTM D5314-92. Passive sampling approaches can be considered as an alternative for clay soils. However most passive sampling approaches are not currently capable of quantitative estimation of soil gas concentration.

- It is important to record the canister pressure, start and stop times and ID on a proper field sampling form. You should observe and record the time/pressure at a mid-point in the sample duration. It is a good practice to lightly tap the pressure gauge with your finger before reading it to make sure it isn't stuck.
- Ensure that there is still measureable vacuum in the SUMMA® after sampling. Sometimes the gauges sent from labs have offset errors, or they stick.
- When sampling carefully consider elevation. If your site is over 2,000' above sea level or the difference in elevation between your site and your lab is more than 2,000' then pressure effects will be significant. If you take your samples at a high elevation they will contain less air for a given ending pressure reading. High elevation samples analyzed at low elevation will result in more dilution at the lab, which could affect reporting limits. Conversely low elevation

samples when received at high elevation may appear to not have much vacuum left in them. http://www.uigi.com/Atmos_pressure.html.

- If possible, have equipment shipped a two or three days before the sampling date so that all materials can be checked. Order replacements if needed.
- Requesting extra canisters and extra sorbent tubes from the laboratory should also be considered to ensure that you have enough equipment on site in case of an equipment failure.
- Shallow exterior soil-gas sampling should not proceed within 5 days following a significant rain event (1/2-inch of rainfall or more).

VI. Procedure

Soil-Gas Sample Preparation

Selection of Sorbent and Sampling Volume (to be completed prior to sampling event)

1. Identify the necessary final reporting limit for the target compound(s) in accordance with the project quality assurance plan and/or in consultation with the data end user.
2. Identify the necessary method reporting limit(s). The laboratory will be helpful in providing this information as it is typically specific to the sensitivity of the instrumentation.
3. The minimum sampling volume is the volume of soil-gas sample that must be drawn through the sorbent in order to achieve the desired final reporting limit. Calculate the minimum sampling volume using the following equation:

$$\text{Minimum Sampling Volume (L)} = \frac{\text{Final Reporting Limit } (\mu\text{g})}{\text{Action Level } (\mu\text{g}/\text{m}^3)} \times \frac{1,000 \text{ L}}{\text{m}^3}$$

Where:

L = liters

μg = microgram

m = meter

4. If a timed sample duration is specified in the work plan, calculate the minimum flow rate. The minimum flow rate is the flow rate necessary to achieve the minimum sampling volume using the following formula:

$$\text{Minimum Flow Rate (L/min)} = \frac{\text{Minimum Sampling Volume (L)}}{\text{Sample Duration (min)}}$$

Where:

min = minutes

Then compare the minimum flow rate calculated to the requirements for maximum soil gas sampling without excessive danger of short circuiting, normally stated as 0.2 liters/minute, although it can be lower in tight soils. Soil vapor sampling flow rates should not exceed 200 ml/min.

5. Compare the minimum sampling volume to the safe sampling volume (SSV) for the sorbents selected. SSV for specific sorbents can be provided by the manufacturer or the laboratory, being used (Table 1 and Appendix 1 in Method TO-17). Ensure that the compound will not breakthrough when sampling the volume calculated above.

Soil-Gas Sample Collection

Calibration of the sample pump prior to assembly of sampling train

1. Attach the sample flow rate calibration tube provided by the laboratory to the inlet of the sample pump using a section of tubing. Attach the flow calibrator to the inlet of the sample flow rate calibration tube. The sample flow rate calibration tube should be clearly marked by the laboratory with an arrow indicating flow direction (or as otherwise specified by the laboratory).
2. Turn on the sample pump and adjust the flow rate on the sample pump to achieve the desired minimum flow rate (calculated above) as measured by the flow calibrator.
3. Repeat until each sampling pump has been properly calibrated to its appropriate flow rate.

Assembly of combined TO-17 and TO-15 sampling train

1. Record the following information in the field notebook, if appropriate (contact the local airport or other suitable information source [e.g., site-specific measurements, weatherunderground.com] to obtain the information):
 - a. wind speed and direction;
 - b. ambient temperature;
 - c. barometric pressure; and
 - d. relative humidity.
2. If samples are being collected from temporary or permanent soil vapor points simply remove the cap or plug and proceed to step 3. When collecting samples from a sub-slab port remove the cap or plug from the sampling port. Connect a short piece of Teflon or Teflon-lined tubing to the sampling port using a Swagelok or equivalent stainless-steel or comparable compression fitting.
3. Connect the Teflon or Teflon-lined tubing to a stainless steel T fitting using a Swagelok or equivalent stainless-steel or comparable compression fitting.
4. Remove the brass cap from the SUMMA® canister and connect the flow controller with in-line particulate filter and vacuum gauge to the SUMMA® canister. Do not open the valve on the SUMMA® canister. Record in the field notebook and COC form the flow controller number with the appropriate SUMMA® canister number.
5. Connect the flow controller to the stainless steel T fitting using a Swagelok or equivalent stainless-steel or comparable compression fitting. The TO-15 leg of the combined sampling train is now complete.
6. Attach a length of Teflon or Teflon-lined tubing to the free end of the stainless steel T fitting using a Swagelok or equivalent stainless-steel or comparable compression fitting.
7. Connect TO-17 sorbent tubes with vertical orientation and the correct flow direction using compression fittings and appropriate T's.
8. Complete the remainder of the sampling train as depicted in Figure 1.

Purge Sampling Assembly and Sampling Point Prior to Sample Collection.

1. Ensure the two-way valve next to the flow rate calibration tube is open and the two way valve next to the TO-17 sampling tubes is closed. Purge three volumes of air from the vapor probe and sampling line using the portable pump. Measure organic vapor levels with the PID. Lower flow rates may be necessary in silt or clay to avoid excessive vacuum. Vacuum reading greater than 136 inches of water column are clearly excessive. Other available sources cite a cutoff of greater than 10 inches of water column.
2. Check the seal established around the soil vapor probe and the sampling train fittings by using a tracer gas (e.g., helium) or other method established in applicable regulatory guidance documents. [Note: Refer to ARCADIS SOP "Administering Tracer Gas," adapted from NYSDOH 2005, for procedures on tracer gas use.]
3. When three volumes of air have been purged from the vapor probe and sampling line stop the purge pump and close the valve next to the flow rate calibration tube.

TO-15 Sample Collection

1. Open the SUMMA® canister valve to initiate sample collection. Record on the sample log (attached) the time sampling began and the canister pressure.

If the initial vacuum pressure registered is not between -30 and -25 inches of Hg, then the SUMMA® canister is not appropriate for use and another canister should be used.

2. Take a photograph of the SUMMA® canister and surrounding area (unless photography is restricted by the property owner).
3. Check the SUMMA canister approximately half way through the sample duration and note progress on sample logs.

TO-15 Sample Termination

1. Arrive at the SUMMA® canister location at least 10 to 15 minutes prior to the end of the sampling interval.
2. Record the final vacuum pressure. Stop collecting the sample by closing the SUMMA® canister valves. The canister should have a minimum amount of vacuum (approximately 6 inches of Hg or slightly greater).

3. Record the date and time of valve closing in the field notebook, sample collection log, and COC form.

TO-17 Sample Collection

1. Record in the field notebook and COC form the tube number on the TO-17 tube.
2. Open the two-way valve next to the TO-17 tubes
3. Turn on the sample pump to begin sample collection. Use a stopwatch to ensure accuracy in pumping time. Record in the field notebook and the field sample log the time sampling began and the flow rate from each of the sample pumps.

Termination of Sample Collection

1. Stop the sample pumps after the desired volume of soil-gas has passed through the sorbent, and close the two-way valves next to the TO-17 sample tubes.
2. Record the stop time.
3. Detach the Tedlar bag from each sample pump and measure the helium concentration in the soil-gas collected by the Tedlar bag. Record any detections in the field book and sample collection log.
4. Open the two-way valve to permit flow through the flow rate calibration tube. Reconnect each of the sampling pumps and measure the flow rate. Record the post-sampling flow rates in the field log book and the sample collection logs. The post-sampling flow rate should match within 10% of the pre-sample flow rate. Average the pre-sampling and post-sampling flow rate and record in the field log book, and the sample collection log.
5. Calculate the sample volume using the average of the pre-sample and post-sample flow rate. Record the sample volume in the field log book, the sample collection log, and on the COC.
6. Package the tubes according to laboratory protocol on gel ice and ship to the laboratory for analysis.

VII. Waste Management

The waste materials generated during sampling activities should be minimal. PPE, such as gloves and other disposable equipment (i.e., tubing), will be collected by field personnel for proper disposal.

VIII. Data Recording and Management

Measurements will be recorded in the field notebook at the time of measurement with notations of the project name, sample date, sample start and finish time, sample location (e.g., GPS coordinates, distance from permanent structure), tube type and number and sample volume. Field sampling logs and COC records will be transmitted to the Project Manager.

IX. Quality Assurance

Duplicate samples should be collected in the field as a quality assurance step. Generally, duplicates are taken of 10% of samples, but project specific requirements should take precedence. Duplicate soil gas samples should be collected via a split sample train, allowing the primary and duplicate sample to be collected from the soil-gas probe simultaneously.

Quality assurance planning for method TO-17 should take careful note of the method requirement for distributed volume pairs. Although in some circumstances this requirement may be waived, this does constitute a deviation from the method as written. It is wise to discuss this decision with clients and/or regulators before sampling.

Soil-gas sample analysis will be performed using USEPA TO-17 methodology for a site specific constituent list defined in the work plan. Constituent lists and reporting limits must be discussed with the laboratory prior to mobilizing for sampling. Quality assurance parameters should be confirmed with the laboratory prior to sampling. Field quality assurance parameters should be defined in the site-specific work plan. A trip blank sample should accompany each shipment of soil-gas samples to the laboratory for analysis. Trip blanks assess potential sample contamination resulting from the transportation and storing of samples. Soil-gas sample analysis will generally be performed using USEPA TO-15 methodology or a project specific constituent list. Method TO-15 uses a quadrupole or ion-trap GC/MS with a capillary column to provide optimum detection limits (typically 0.5-ppbv for most VOCs).

X. References


New York State Department of Health (NYSDOH). 2005. DRAFT "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" February 23, 2005.

AirToxics Ltd. "Sorbent & Solution Sampling Guide."



Appendix D

Sub-Slab Soil Vapor Sample
Collection Logs

 ARCADIS Infrastructure, environment, facilities		Soil-Gas Sample Collection Log	
		Sample ID:	5
Client:	CEMC	Date/Day:	SSVP-1
Project:	354472	Weather:	Friday 12/5/14
Location:	5528 NW Dome Ave PDX	Temperature:	70°F Indoor
Project #:	B0046601.0009.00260	Wind Speed/Direction:	N/A indoor
Samplers:	BM/EE	Subcontractor:	—
Logged By:	BM/EE	Equipment:	1 Liter Summa ⁵ canisters
Coordinates:	—	Moisture Content of Sampling Zone (circle one):	(Dry) Moist
Sampling Depth:	Subslab	Approximate Purge Volume:	~300mL
Time of Collection:	10:00 - 10:11	Background PID Ambient Air Reading:	242 ppb

Nearby Groundwater Monitoring Wells/Water Levels:

Well ID	Depth to Groundwater (ft)
—	—
—	—
—	—

Tracer Gas Information (if applicable)

Tracer Gas: VHP Helium
 Manufacturer: Airgas

SUMMA Canister Information: (1 L) 6 L

Canister ID: 34088

Flow Controller ID: _____

Equipment Certification:

(100% Certified) Batch Certified

Sorbent Tube Information:

Sorbent Tube ID: 60143632 / 60143726Sample Volume: 30 mL / 100 mL
10:16 10:14

Canister Pressure (inches Hg):

Reported By Laboratory	Measured Prior to Sample Collection	Measured Following Sample Collection
—	-29	-5

Tracer Gas Concentration (if applicable):

Measured in Purge Effluent	Measured in 'Concentrated' Area Prior to Sample Collection	Measured in 'Concentrated' Area Following Sample Collection
0.0	18 - 17 %	23.5 %

Purge Effluent Information

VOCs (ppm)	Flamability (% LEL)	Oxygen (%)
0.0	0.0 %	17.3 %

General Observations/Notes:

CO2 = 0.2 %


Leak down / shut off test passed @ 12 in Hg for 3 minutes

Background ambient VOCs ranging from 250 - 550 ppb

Approximating One-Well Volume (for purging):

When using 1¼-inch "Dummy Point" and a 6-inch sampling interval, the sampling space will have a volume of approximately 150 mL. Each foot of ¼-inch tubing will have a volume of approximately 10 mL.

Duplicate

 ARCADIS Infrastructure, environment, facilities		Soil-Gas Sample Collection Log	
		Sample ID:	SSVP-2
Client:	CEMC	Date/Day:	Friday 12/5/14
Project:	354972	Weather:	55°F Cloudy
Location:	5520 NW Down PDX	Temperature:	55°F
Project #:	B0046601.0002.00260	Wind Speed/Direction:	NA - Indoor
Samplers:	Bm/EE	Subcontractor:	-
Logged By:	Bm/EF	Equipment:	1 L Summa Samplers
Coordinates:	-	Moisture Content of Sampling Zone (circle one):	(Dry) / Moist
Sampling Depth:	Sub Slab	Approximate Purge Volume:	~300 mL
Time of Collection:	11:01 - 11:10 - Parent	Background PID Ambient Air Reading:	29 ppb

11:01 - 11:12 - Duplicate
 Nearby Groundwater Monitoring Wells/Water Levels:

Well ID	Depth to Groundwater (ft)
-	-
-	-
-	-

Tracer Gas Information (if applicable)

Tracer Gas: UHP Helium
 Manufacturer: Airgas

Parent / Duplicate
 SUMMA Canister Information: 1D 6L

Canister ID: 37753 / 141621

Flow Controller ID: FCC0744 / FCC0832

Equipment Certification:

100% Certified

Batch Certified

Sorbent Tube Information :

Parent Duplicate
 Sorbent Tube ID: 60147211 / 60147391 / 60141315 / 60132038

Sample Volume: 30 mL / 100 mL / 30 mL / 100 mL

Canister Pressure (inches Hg):	11:24 / 11:19	11:26 / 11:21
Reported By Laboratory	Measured Prior to Sample Collection	Measured Following Sample Collection
-	-30 / -29	-5 / -5

Tracer Gas Concentration (if applicable):

Measured in Purge Effluent	Measured in 'Concentrated' Area Prior to Sample Collection	Measured in 'Concentrated' Area Following Sample Collection
0.0	30%	20.1 - 25.1%

Purge Effluent Information


VOCs (ppm)	Flamability (% LEL)	Oxygen (%)
63 ppb	0.0	17.9%

General Observations/Notes:

CO2 - 1.2 %
 Shut in test passed @ 11.5 for 3m.
 Duplicate inline sample collected for TO-15 const. TO-17 Duplicates collected directly

Approximating One-Well Volume (for purging):

When using 1/4-inch "Dummy Point" and a 6-inch sampling interval, the sampling space will have a volume of approximately 150 mL. Each foot of 1/4-inch tubing will have a volume of approximately 10 mL.

 ARCADIS Infrastructure, environment, facilities		Soil-Gas Sample Collection Log	
		Sample ID:	SSVP-3
Client:	CEMC	Date/Day:	12/4/14 Thurs.
Project:	354972	Weather:	Rain
Location:	5528 NW 20th PDX	Temperature:	55° out 70° indoor
Project #:	B0046601-0009-01260	Wind Speed/Direction:	N/A Indoor
Samplers:	BM/EE	Subcontractor:	N/A
Logged By:	BM/EE	Equipment:	1L SUMMA
Coordinates:	—	Moisture Content of Sampling Zone (circle one):	(Dry) / Moist
Sampling Depth:	Sub-Slab	Approximate Purge Volume:	~300 mL
Time of Collection:	1503 → 1515	Background PID Ambient Air Reading:	0.0

Nearby Groundwater Monitoring Wells/Water Levels:

Well ID	Depth to Groundwater (ft)
—	—
—	—
—	—

Tracer Gas Information (if applicable)

Tracer Gas: UHP Helium
 Manufacturer: Airgas

SUMMA Canister Information: 1L 6 L

Canister ID: IL1701

Flow Controller ID: FC00306

Equipment Certification:

100% Certified

Batch Certified

Sorbent Tube Information:

Sorbent Tube ID: G0135682 / G0143682

Sample Volume: 30 mL / 100 mL
1520 1517

Canister Pressure (inches Hg):

Reported By Laboratory	Measured Prior to Sample Collection	Measured Following Sample Collection
—	-30	-5

Tracer Gas Concentration (if applicable):

Measured in Purge Effluent	Measured in 'Concentrated' Area Prior to Sample Collection	Measured in 'Concentrated' Area Following Sample Collection
0.0	17.5%	18%

Purge Effluent Information


VOCs (ppm)	Flamability (% LEL)	Oxygen (%)
45	0.0	13.5%

General Observations/Notes:

CO2 = 4.6%
 Leak down check passed @ 12 in Hg for 5 min

Approximating One-Well Volume (for purging):

When using 1¼-inch "Dummy Point" and a 6-inch sampling interval, the sampling space will have a volume of approximately 150 mL. Each foot of ¼-inch tubing will have a volume of approximately 10 mL.

 ARCADIS Infrastructure, environment, facilities		Soil-Gas Sample Collection Log	
		Sample ID:	SSVP-4
Client:	Chenoweth EMC	Date/Day:	12/4/14 Thurs.
Project:	354972	Weather:	55°F Indoors
Location:	5528 NW Down Ave PDX	Temperature:	Rainy
Project #:	B0046601 - 0008, 00260	Wind Speed/Direction:	Indoor
Samplers:	BM/EE	Subcontractor:	N/A
Logged By:	BM/EE	Equipment:	1 L Summa
Coordinates:	-	Moisture Content of Sampling Zone (circle one):	(Dry) / Moist
Sampling Depth:	Sub-Slab	Approximate Purge Volume:	~300 mL
Time of Collection:	13:17 - 13:26	Background PID Ambient Air Reading:	135 ppb

TO-15 → 1332 (100) 13:35 (30)
 Nearby Groundwater Monitoring Wells/Water Levels:

Well ID	Depth to Groundwater (ft)
-	-
-	-
-	-

Tracer Gas Information (if applicable)

Tracer Gas: UHP Helium
 Manufacturer: Air Gas

SUMMA Canister Information: (1 L) 6 L

Canister ID: 1L1679

Flow Controller ID: FC00

Equipment Certification:

(100% Certified)

Batch Certified

Sorbent Tube Information:

Sorbent Tube ID: 6037179 / G1050385

Sample Volume: 30 mL / 100 mL

Canister Pressure (inches Hg):		
Reported By Laboratory	Measured Prior to Sample Collection	Measured Following Sample Collection
-	+7.6 BM -28	-5 in Hg

Tracer Gas Concentration (if applicable):		
Measured in Purge Effluent	Measured in 'Concentrated' Area Prior to Sample Collection	Measured in 'Concentrated' Area Following Sample Collection
0.0 ppm	17.6 %	-18%

Purge Effluent Information		
VOCs (ppm)	Flamability (% LEL)	Oxygen (%)
180	0.0 % <input checked="" type="checkbox"/>	18%

General Observations/Notes:


CO2 → 1.2

Shut in passed @ -12 inHg for 5 min

Initial sample did not collect. port cleared with 10 mL air and and canister reattached. Initial vacuum -30 inHg vacuum after reattached -28 inHg

Approximating One-Well Volume (for purging):

When using 1 1/4-inch "Dummy Point" and a 6-inch sampling interval, the sampling space will have a volume of approximately 150 mL. Each foot of 1/4-inch tubing will have a volume of approximately 10 mL.

 ARCADIS Infrastructure, environment, facilities		Soil-Gas Sample Collection Log	
		Sample ID:	SSVP-5
Client:	CEMC	Date/Day:	Thurs. 12/4/14
Project:	354972	Weather:	Rain
Location:	5528 NUDome PDX	Temperature:	55°F at
Project #:	B0046601.0008	Wind Speed/Direction:	Indoor ~70
Samplers:	BM/EE	Subcontractor:	N/A
Logged By:	BM/EE	Equipment:	1L SUMMA / Scripts
Coordinates:	—	Moisture Content of Sampling Zone (circle one):	(Dry) / Moist
Sampling Depth:	Sub-Slab	Approximate Purge Volume:	~300 mL
Time of Collection:	1410 - 1422	Background PID Ambient Air Reading:	151 ppb

Nearby Groundwater Monitoring Wells/Water Levels:

Well ID	Depth to Groundwater (ft)
—	—
—	—
—	—

Tracer Gas Information (if applicable)

Tracer Gas: UHP Helium
 Manufacturer: Airgas

SUMMA Canister Information: (1) 6 L

Canister ID: 13390

Flow Controller ID: FC00591

Equipment Certification:

(100% Certified)

Batch Certified

Sorbent Tube Information: G1043036/6041370

Sorbent Tube ID: FC00591-BM

Sample Volume: 30 mL / 100 mL
1420 1425

Canister Pressure (inches Hg):

Reported By Laboratory	Measured Prior to Sample Collection	Measured Following Sample Collection
—	-30	-5 -21-BM

Tracer Gas Concentration (if applicable):

Measured in Purge Effluent	Measured in 'Concentrated' Area Prior to Sample Collection	Measured in 'Concentrated' Area Following Sample Collection
0.0	30%	+21%

Purge Effluent Information


VOCs (ppm)	Flamability (% LEL)	Oxygen (%)
45 ppb	0.0%	14.5

General Observations/Notes:

4% CO2
Leak down check passed @ -13 in Hg for 3 minutes
~13 mL displaced in port to clear

Approximating One-Well Volume (for purging):

When using 1¼-inch "Dummy Point" and a 6-inch sampling interval, the sampling space will have a volume of approximately 150 mL. Each foot of ¼-inch tubing will have a volume of approximately 10 mL.

 ARCADIS Infrastructure, environment, facilities		Soil-Gas Sample Collection Log	
		Sample ID:	SSVP-6
Client:	Chevron EMC	Date/Day:	12/4/14 Thurs
Project:	354972	Weather:	55°F Rainy
Location:	5320 NW Danae PDX, OR	Temperature:	—
Project #:	80046601.0000.00260	Wind Speed/Direction:	NA Indoor
Samplers:	BM/EE	Subcontractor:	N/A
Logged By:	BM/EE	Equipment:	1 SUMMA, Sorbent Tube
Coordinates:	—	Moisture Content of Sampling Zone (circle one):	(Dry) Moist
Sampling Depth:	~6" - Sub-slab	Approximate Purge Volume:	300 mL
Time of Collection:	10:07 → 10:17 10:12 am	Background PID Ambient Air Reading:	0.0 100 ppb

Nearby Groundwater Monitoring Wells/Water Levels:

Well ID	Depth to Groundwater (ft)
—	—
—	—
—	—

Tracer Gas Information (if applicable)

Tracer Gas: UHP Helium

Manufacturer: Airgas

SUMMA Canister Information: (1 L) 6 L

Canister ID: 1L688

Flow Controller ID: 20995

Equipment Certification:

(100% Certified)

Batch Certified

Sorbent Tube Information:

Sorbent Tube ID: 60132026 / 60145590

Sample Volume: 30 mL / 100 mL
0.1227 0.1225

Canister Pressure (inches Hg):

Reported By Laboratory	Measured Prior to Sample Collection	Measured Following Sample Collection
—	-30	-5

Tracer Gas Concentration (if applicable):

Measured in Purge Effluent	Measured in 'Concentrated' Area Prior to Sample Collection	Measured in 'Concentrated' Area Following Sample Collection
0.0	17.3 ~ 18.6	16.0 %

Purge Effluent Information


VOCs (ppm) ppb	Flamability (% LEL)	Oxygen (%)
157	0.0 % by Vol.	15.2 %

General Observations/Notes:

Shot in test passed @ -12 in Hg for 5 minutes

Approximating One-Well Volume (for purging):

When using 1/4-inch "Dummy Point" and a 6-inch sampling interval, the sampling space will have a volume of approximately 150 mL. Each foot of 1/4-inch tubing will have a volume of approximately 10 mL.

 ARCADIS Infrastructure, environment, facilities		Soil-Gas Sample Collection Log	
		Sample ID:	SSYP-87
Client:	CEMC	Date/Day:	12/4/14 Thurs.
Project:	354972	Weather:	Grey & Cloudy
Location:	5528 NW Dore PDX	Temperature:	55°F
Project #:	80046601, 0008, 00260	Wind Speed/Direction:	NA Indoor
Samplers:	BM/EE	Subcontractor:	N/A
Logged By:	BM/EE	Equipment:	1L Summa Sorbents
Coordinates:	—	Moisture Content of Sampling Zone (circle one):	(Dry) / Moist
Sampling Depth:	sub slab	Approximate Purge Volume:	~300
Time of Collection:	1701 - 1713	Background PID Ambient Air Reading:	50 ppb

Nearby Groundwater Monitoring Wells/Water Levels:

Well ID	Depth to Groundwater (ft)
—	—
—	—
—	—

Tracer Gas Information (if applicable)

Tracer Gas: UHP He
 Manufacturer: Airgas

SUMMA Canister Information: 1L 6 L

Canister ID: 1L1686
 Flow Controller ID: FC0370

Equipment Certification:

(100% Certified) Batch Certified

Sorbent Tube Information:

Sorbent Tube ID: 60145507 / 60143423
 Sample Volume: 30 mL / 100 mL
 1721 1713

Canister Pressure (inches Hg):

Reported By Laboratory	Measured Prior to Sample Collection	Measured Following Sample Collection
—	-30	-5

Tracer Gas Concentration (if applicable):

Measured in Purge Effluent	Measured in 'Concentrated' Area Prior to Sample Collection	Measured in 'Concentrated' Area Following Sample Collection
0.0	14.3 - 15.6%	14.3 - 12.9

Purge Effluent Information


VOCs (ppm)	Flamability (% LEL)	Oxygen (%)
201	0.0	20.4

General Observations/Notes:

CO2 = 0.6
 Leak down passed @ 12 in Hg for 3 minutes

Approximating One-Well Volume (for purging):

When using 1/4-inch "Dummy Point" and a 6-inch sampling interval, the sampling space will have a volume of approximately 150 mL. Each foot of 1/4-inch tubing will have a volume of approximately 10 mL.

 ARCADIS Infrastructure, environment, facilities		Soil-Gas Sample Collection Log	
		Sample ID:	Equipment Blank
Client:	Chemura EMC	Date/Day:	Friday 12/5/14
Project:	354972	Weather:	55°F Cloudy
Location:	5528 NW Downe PDX	Temperature:	-
Project #:	B0040601.0008.0020	Wind Speed/Direction:	N/A Indoor
Samplers:		Subcontractor:	-
Logged By:	BM/EE	Equipment:	1L Sample
Coordinates:	-	Moisture Content of Sampling Zone (circle one):	<input checked="" type="radio"/> Dry <input type="radio"/> Moist
Sampling Depth:	N/A	Approximate Purge Volume:	N/A
Time of Collection:	11:36 - 11:43	Background PID Ambient Air Reading:	0.0

Nearby Groundwater Monitoring Wells/Water Levels:

Well ID	Depth to Groundwater (ft)
-	-
-	-
-	-

Tracer Gas Information (if applicable)

Tracer Gas: VHP Helium
 Manufacturer: Airgas

SUMMA Canister Information: 1 L 6 L

Canister ID: 35593

Flow Controller ID: FC00440

Equipment Certification:

☒ 100% Certified ☐ Batch Certified

Sorbent Tube Information:

Sorbent Tube ID: 60139964 @ 11:27

Sample Volume: N/A

Canister Pressure (inches Hg):		
Reported By Laboratory	Measured Prior to Sample Collection	Measured Following Sample Collection
-	-30	-5

Tracer Gas Concentration (if applicable):		
Measured in Purge Effluent	Measured in 'Concentrated' Area Prior to Sample Collection	Measured in 'Concentrated' Area Following Sample Collection
-	-	15.2

Purge Effluent Information		
VOCs (ppm)	Flamability (% LEL)	Oxygen (%)
-	-	-

General Observations/Notes:

Blank sample collected with Lab provided N ₂

Approximating One-Well Volume (for purging):

When using 1/4-inch "Dummy Point" and a 6-inch sampling interval, the sampling space will have a volume of approximately 150 mL. Each foot of 1/4-inch tubing will have a volume of approximately 10 mL.



Appendix E

Soil Gas Laboratory Analytical Data Results

12/24/2014

Mr. Eric Epple
Arcadis U.S., Inc.
1100 Olive Way
Ste 800
Seattle WA 98101

Project Name: 354972
Project #: B0046601.0008.00260
Workorder #: 1412089A

Dear Mr. Eric Epple

The following report includes the data for the above referenced project for sample(s) received on 12/6/2014 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-17 VI are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Kelly Buettner
Project Manager

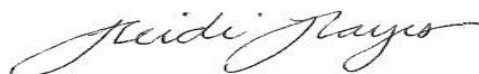
WORK ORDER #: 1412089A

Work Order Summary

CLIENT:	Mr. Eric Epple Arcadis U.S., Inc. 1100 Olive Way Ste 800 Seattle, WA 98101	BILL TO:	Accounts Payable Arcadis U.S., Inc. 630 Plaza Drive Suite 600 Highlands Ranch, CO 80129
PHONE:	206-726-4755	P.O. #	B0046601.0008
FAX:	206-325-8218	PROJECT #	B0046601.0008.00260 354972
DATE RECEIVED:	12/06/2014	CONTACT:	Kelly Buettner
DATE COMPLETED:	12/24/2014		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>
02A	SSVP-1 (100 mL)	Modified TO-17 VI
04A	SSVP-2 (100 mL)	Modified TO-17 VI
06A	SSVP-3 (100 mL)	Modified TO-17 VI
08A	SSVP-4 (100 mL)	Modified TO-17 VI
10A	SSVP-5 (100 mL)	Modified TO-17 VI
11A	Lab Blank	Modified TO-17 VI
12A	CCV	Modified TO-17 VI
13A	LCS	Modified TO-17 VI
13AA	LCSD	Modified TO-17 VI

CERTIFIED BY:



Technical Director

DATE: 12/24/14

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704343-14-7, UT NELAP CA009332014-5, VA NELAP - 460197, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2014, Expiration date: 10/17/2015.

Eurofins Air Toxics Inc., certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 9563
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified EPA Method TO-17 (VI Tubes)
Arcadis U.S., Inc.
Workorder# 1412089A

Five TO-17 VI Tube samples were received on December 06, 2014. The laboratory performed the analysis via modified EPA Method TO-17 using GC/MS in the full scan mode. TO-17 'VI' sorbent tubes are thermally desorbed onto a secondary trap. The trap is thermally desorbed to elute the components into the GC/MS system for compound separation and detection.

A modification that may be applied to EPA Method TO-17 at the client's discretion is the requirement to transport sorbent tubes at 4 deg C. Laboratory studies demonstrate a high level of stability for VOCs on the TO-17 'VI' tube at room temperature for periods of up to 14 days. Tubes can be shipped to and from the field site at ambient conditions as long as the 14-day sample hold time is upheld. Trip blanks and field surrogate spikes are used as additional control measures to monitor recovery and background contribution during tube transport.

Since the TO-17 VI application significantly extends the scope of target compounds addressed in EPA Method TO-15 and TO-17, the laboratory has implemented several method modifications outlined in the table below. Specific project requirements may over-ride the laboratory modifications.

<i>Requirement</i>	<i>TO-17</i>	<i>ATL Modifications</i>
Initial Calibration	%RSD \leq 30% with 2 allowed out up to 40%	VOC list: %RSD \leq 30% with 2 allowed out up to 40% SVOC list: %RSD \leq 30% with 2 allowed out up to 40%
Daily Calibration	%D for each target compound within \pm 30%.	Fluorene, Phenanthrene, Anthracene, Fluoranthene, and Pyrene within \pm 40%D
Audit Accuracy	70-130%	Second source recovery limits for Fluorene, Phenanthrene, Anthracene, Fluoranthene, and Pyrene = 60-140%.
Distributed Volume Pairs	Collection of distributed volume pairs required for monitoring ambient air to insure high quality.	If the client is sampling well characterized air or has verified performance through previous sampling or distributed pairs, single tube sampling may be appropriate. Distributed volume pairs may not be practical or useful for soil vapor collection due to
Analytical Precision	\leq 20% RPD	\leq 30% RPD for Fluorene, Phenanthrene, Anthracene, Fluoranthene, and Pyrene.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

A sampling volume of 0.100 L was used to convert ng to ug/m3 for the associated Lab Blank.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in blank (subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

Summary of Detected Compounds EPA METHOD TO-17

Client Sample ID: SSVP-1 (100 mL)

Lab ID#: 1412089A-02A

No Detections Were Found.

Client Sample ID: SSVP-2 (100 mL)

Lab ID#: 1412089A-04A

No Detections Were Found.

Client Sample ID: SSVP-3 (100 mL)

Lab ID#: 1412089A-06A

No Detections Were Found.

Client Sample ID: SSVP-4 (100 mL)

Lab ID#: 1412089A-08A

No Detections Were Found.

Client Sample ID: SSVP-5 (100 mL)

Lab ID#: 1412089A-10A

No Detections Were Found.

Client Sample ID: SSV-1 (100 mL)

Lab ID#: 1412089A-02A

EPA METHOD TO-17

PARAMETER 10: 1				
File Name:	6120813	Date of Extraction: NA	Date of Collection: 12/5/14 10:16:00 AM	
Dil. Factor:	1.00	Date of Analysis: 12/8/14 09:05 PM		
Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
TPH (Diesel Range C10-C24)	1000	10000	Not Detected	Not Detected

Air Sample Volume(L): 0.100

Container Type: TO-17 VI Tube

Client Sample ID: SSV-2 (100 mL)

Lab ID#: 1412089A-04A

EPA METHOD TO-17

File Name:	6120814	Date of Extraction: NA	Date of Collection: 12/5/14 11:19:00 AM	
Dil. Factor:	1.00		Date of Analysis: 12/8/14 09:43 PM	
Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
TPH (Diesel Range C10-C24)	1000	10000	Not Detected	Not Detected

Air Sample Volume(L): 0.100

Container Type: TO-17 VI Tube

Client Sample ID: SSV-3 (100 mL)

Lab ID#: 1412089A-06A

EPA METHOD TO-17

File Name:	6120815	Date of Extraction: NA	Date of Collection: 12/4/14 3:17:00 PM
Dil. Factor:	1.00	Date of Analysis: 12/8/14 10:21 PM	

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
TPH (Diesel Range C10-C24)	1000	10000	Not Detected	Not Detected

Air Sample Volume(L): 0.100

Container Type: TO-17 VI Tube

Client Sample ID: SSV-4 (100 mL)

Lab ID#: 1412089A-08A

EPA METHOD TO-17

File Name:	6120816	Date of Extraction: NA	Date of Collection: 12/4/14 1:32:00 PM	
Dil. Factor:	1.00		Date of Analysis: 12/8/14 10:58 PM	
Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
TPH (Diesel Range C10-C24)	1000	10000	Not Detected	Not Detected

Air Sample Volume(L): 0.100

Container Type: TO-17 VI Tube

Client Sample ID: SSV-5 (100 mL)

Lab ID#: 1412089A-10A

EPA METHOD TO-17

File Name:	6120817	Date of Extraction: N/A	Date of Collection: 12/4/14 2:25:00 PM
Dil. Factor:	1.00	Date of Analysis: 12/8/14 11:37 PM	

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
TPH (Diesel Range C10-C24)	1000	10000	Not Detected	Not Detected

Air Sample Volume(L): 0.100

Container Type: TO-17 VI Tube

Client Sample ID: Lab Blank

Lab ID#: 1412089A-11A

EPA METHOD TO-17

PARAMETER TO 1:				
File Name:	6120807	Date of Extraction: NA	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 12/8/14 12:39 PM		
Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
TPH (Diesel Range C10-C24)	1000	10000	Not Detected	Not Detected

Air Sample Volume(L): 0.100

Container Type: NA - Not Applicable

Client Sample ID: CCV

Lab ID#: 1412089A-12A

EPA METHOD TO-17

File Name:	6120804	Date of Extraction: NA	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/8/14 10:39 AM	

Compound	%Recovery
-----------------	------------------

TPH (Diesel Range C10-C24)	114
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Air Sample Volume(L): 1.00

Container Type: NA - Not Applicable

Client Sample ID: LCS

Lab ID#: 1412089A-13A

EPA METHOD TO-17

File Name:	6120805	Date of Extraction: NA	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/8/14 11:16 AM	

Compound	%Recovery	Method Limits
TPH (Diesel Range C10-C24)	109	60-140

Air Sample Volume(L): 1.00

Container Type: NA - Not Applicable

Client Sample ID: LCSD

Lab ID#: 1412089A-13AA

EPA METHOD TO-17

File Name:	6120806	Date of Extraction: NA	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/8/14 11:53 AM	

Compound	%Recovery	Method Limits
TPH (Diesel Range C10-C24)	109	60-140

Air Sample Volume(L): 1.00

Container Type: NA - Not Applicable

TO-17 SAMPLE COLLECTION

Air Toxics LTD.

CHAIN-OF-CUSTODY RECORD

Sample Transportation Notice

Relinquishing signature on this document indicates that sample is being shipped in compliance with all applicable local, State, Federal, national, and international laws, regulations and ordinances of any kind. Air Toxics Limited assumes no liability with respect to the collection, handling or shipping of these samples. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Air Toxics Limited against any claim, demand, or action, of any kind, related to the collection, handling, or shipping of samples. D.O.T. Hotline (800) 467-4922.

180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630
(916) 985-1000 FAX (916) 985-1020

Page 1 of 1

Project Manager Lynne Fenley
Collected by: (Print and Sign) Brian Marum B-M
Company Arcadis Email Lynne.Fenley@arcadis-us.com
Address 111 SW Columbia St 670 Portland OR Zip 97201
Phone 503-220-8201 Fax 503-220-8209

Project Info:		Turn Around Time: <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Rush specify	Reporting Units: <input type="checkbox"/> ppmv <input type="checkbox"/> ppbv <input type="checkbox"/> µg/m3 <input type="checkbox"/> mg/m3	Indoor Air	Outdoor Air	Soil Vapor	Other (Sub-Slab Vapor)
P.O. #	Project # <u>3549725</u>						
Project Name <u>B0046601-0008-00260</u>							

Lab I.D.	Field Sample I.D. (Location)	Engraved or Stamped Tube #	Date of Collection (mm/dd/yy)	Start Time (hr:min)	End Time (hr:min)	Pre-Test Flow Rate	Post-Test Flow Rate (ppb)	Volume (mL)	Indoor/Outdoor % RH	Temp	Indoor Air	Outdoor Air	Soil Vapor	Other (Sub-Slab Vapor)
<u>01A</u>	<u>SSVP-1 (30 mL)</u>	<u>G0143632</u>	<u>12/5/14</u>	<u>—</u>	<u>10:14</u>	<u>—</u>	<u>0.0</u>	<u>30</u>	<u>—</u>	<u>—</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<u>02A</u>	<u>SSVP-1 (100 mL)</u>	<u>G0143726</u>	<u>12/5/14</u>	<u>—</u>	<u>10:16</u>	<u>—</u>	<u>0.0</u>	<u>100</u>	<u>—</u>	<u>—</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<u>03A</u>	<u>SSVP-2 (30 mL)</u>	<u>G0147211</u>	<u>12/5/14</u>	<u>—</u>	<u>11:24</u>	<u>—</u>	<u>63</u>	<u>30</u>	<u>—</u>	<u>—</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<u>04A</u>	<u>SSVP-2 (100 mL)</u>	<u>G0147391</u>	<u>12/5/14</u>	<u>—</u>	<u>11:19</u>	<u>—</u>	<u>63</u>	<u>100</u>	<u>—</u>	<u>—</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<u>05A</u>	<u>SSVP-3 (30 mL)</u>	<u>G0135682</u>	<u>12/4/14</u>	<u>—</u>	<u>15:20</u>	<u>—</u>	<u>45</u>	<u>30</u>	<u>—</u>	<u>—</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<u>06A</u>	<u>SSVP-3 (100 mL)</u>	<u>G0143682</u>	<u>12/4/14</u>	<u>—</u>	<u>15:17</u>	<u>—</u>	<u>45</u>	<u>100</u>	<u>—</u>	<u>—</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<u>07A</u>	<u>SSVP-4 (30 mL)</u>	<u>G037179</u>	<u>12/4/14</u>	<u>—</u>	<u>13:35</u>	<u>—</u>	<u>180</u>	<u>30</u>	<u>—</u>	<u>—</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<u>08A</u>	<u>SSVP-4 (100 mL)</u>	<u>G1050395</u>	<u>12/4/14</u>	<u>—</u>	<u>13:32</u>	<u>—</u>	<u>180</u>	<u>100</u>	<u>—</u>	<u>—</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<u>09A</u>	<u>SSVP-5 (30 mL)</u>	<u>G1043036</u>	<u>12/4/14</u>	<u>—</u>	<u>14:30</u>	<u>—</u>	<u>45</u>	<u>30</u>	<u>—</u>	<u>—</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<u>10A</u>	<u>SSVP-5 (100 mL)</u>	<u>G0147470</u>	<u>12/4/14</u>	<u>—</u>	<u>14:25</u>	<u>—</u>	<u>45</u>	<u>100</u>	<u>—</u>	<u>—</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Relinquished by: (signature) <u>B-M</u> Date/Time <u>12/5/14 1600</u>	Received by: (signature) <u>B-M</u> Date/Time <u>12/6/14 1120</u>
Relinquished by: (signature) _____ Date/Time _____	Received by: (signature) _____ Date/Time _____
Relinquished by: (signature) _____ Date/Time _____	Received by: (signature) _____ Date/Time _____

Notes:

TO-17 for TPHd

Analysis on hold pending corresponding TO-15 results. Do not proceed without approval from arcadis.
copy → Brian Marum@arcadis-us and Eide

Lab Use Only	Shipper Name	Air Bill #	Temp (°C)	Condition	Custody Seals Intact?	Work Order #
	<u>FELEX</u>		<u>6.0°C</u>	<u>Good</u>	<u>Yes</u> <u>No</u> <u>None</u>	<u>1412089</u>

12/24/2014

Mr. Eric Epple
Arcadis U.S., Inc.
1100 Olive Way
Ste 800
Seattle WA 98101

Project Name: 354392
Project #: B0046601.0008.00260
Workorder #: 1412090A

Dear Mr. Eric Epple

The following report includes the data for the above referenced project for sample(s) received on 12/6/2014 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-17 VI are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Kelly Buettner
Project Manager

WORK ORDER #: 1412090A

Work Order Summary

CLIENT:	Mr. Eric Epple Arcadis U.S., Inc. 1100 Olive Way Ste 800 Seattle, WA 98101	BILL TO:	Accounts Payable Arcadis U.S., Inc. 630 Plaza Drive Suite 600 Highlands Ranch, CO 80129
PHONE:	206-726-4755	P.O. #	B0046601.0008
FAX:	206-325-8218	PROJECT #	B0046601.0008.00260 354392
DATE RECEIVED:	12/06/2014	CONTACT:	Kelly Buettner
DATE COMPLETED:	12/24/2014		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>
02A	SSVP-6 (100mL)	Modified TO-17 VI
04A	SSVP-7 (100 mL)	Modified TO-17 VI
05A	EQUIPMENT BLANK	Modified TO-17 VI
07A	DUPLICATE (100 mL)	Modified TO-17 VI
08A	Lab Blank	Modified TO-17 VI
09A	CCV	Modified TO-17 VI
10A	LCS	Modified TO-17 VI
10AA	LCSD	Modified TO-17 VI

CERTIFIED BY:



Technical Director

DATE: 12/24/14

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704343-14-7, UT NELAP CA009332014-5, VA NELAP - 460197, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2014, Expiration date: 10/17/2015.

Eurofins Air Toxics Inc. certifies that the test results contained in this report meet all requirements of the NELAC standards

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180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 9563
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified EPA Method TO-17 (VI Tubes)
Arcadis U.S., Inc.
Workorder# 1412090A

Four TO-17 VI Tube samples were received on December 06, 2014. The laboratory performed the analysis via modified EPA Method TO-17 using GC/MS in the full scan mode. TO-17 'VI' sorbent tubes are thermally desorbed onto a secondary trap. The trap is thermally desorbed to elute the components into the GC/MS system for compound separation and detection.

A modification that may be applied to EPA Method TO-17 at the client's discretion is the requirement to transport sorbent tubes at 4 deg C. Laboratory studies demonstrate a high level of stability for VOCs on the TO-17 'VI' tube at room temperature for periods of up to 14 days. Tubes can be shipped to and from the field site at ambient conditions as long as the 14-day sample hold time is upheld. Trip blanks and field surrogate spikes are used as additional control measures to monitor recovery and background contribution during tube transport.

Since the TO-17 VI application significantly extends the scope of target compounds addressed in EPA Method TO-15 and TO-17, the laboratory has implemented several method modifications outlined in the table below. Specific project requirements may over-ride the laboratory modifications.

<i>Requirement</i>	<i>TO-17</i>	<i>ATL Modifications</i>
Initial Calibration	%RSD \leq 30% with 2 allowed out up to 40%	VOC list: %RSD \leq 30% with 2 allowed out up to 40% SVOC list: %RSD \leq 30% with 2 allowed out up to 40%
Daily Calibration	%D for each target compound within \pm 30%.	Fluorene, Phenanthrene, Anthracene, Fluoranthene, and Pyrene within \pm 40%D
Audit Accuracy	70-130%	Second source recovery limits for Fluorene, Phenanthrene, Anthracene, Fluoranthene, and Pyrene = 60-140%.
Distributed Volume Pairs	Collection of distributed volume pairs required for monitoring ambient air to insure high quality.	If the client is sampling well characterized air or has verified performance through previous sampling or distributed pairs, single tube sampling may be appropriate. Distributed volume pairs may not be practical or useful for soil vapor collection due to
Analytical Precision	\leq 20% RPD	\leq 30% RPD for Fluorene, Phenanthrene, Anthracene, Fluoranthene, and Pyrene.

Receiving Notes

Sample collection date was not provided on the Chain of Custody for sample(s) DUPLICATE (100 mL). The client was contacted and a date of 12/4/14 was provided.

Analytical Notes

A sampling volume of 0.100 L was used to convert ng to ug/m³ for the associated Lab Blank.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in blank (subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

Summary of Detected Compounds EPA METHOD TO-17

Client Sample ID: SSVP-6 (100mL)

Lab ID#: 1412090A-02A

No Detections Were Found.

Client Sample ID: SSVP-7 (100 mL)

Lab ID#: 1412090A-04A

No Detections Were Found.

Client Sample ID: EQUIPMENT BLANK

Lab ID#: 1412090A-05A

No Detections Were Found.

Client Sample ID: DUPLICATE (100 mL)

Lab ID#: 1412090A-07A

No Detections Were Found.

Client Sample ID: SSVP-6 (100mL)

Lab ID#: 1412090A-02A

EPA METHOD TO-17

File Name:	6121019	Date of Extraction: NA	Date of Collection: 12/4/14 10:25:00 AM	
Dil. Factor:	1.00		Date of Analysis: 12/11/14 04:12 AM	
Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
TPH (Diesel Range C10-C24)	1000	10000	Not Detected	Not Detected

Air Sample Volume(L): 0.100

Container Type: TO-17 VI Tube

Client Sample ID: SSVP-7 (100 mL)

Lab ID#: 1412090A-04A

EPA METHOD TO-17

File Name:	6121020	Date of Extraction: NA	Date of Collection: 12/4/14 5:17:00 PM
Dil. Factor:	1.00	Date of Analysis: 12/11/14 04:51 AM	

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
TPH (Diesel Range C10-C24)	1000	10000	Not Detected	Not Detected

Air Sample Volume(L): 0.100

Container Type: TO-17 VI Tube

Client Sample ID: EQUIPMENT BLANK

Lab ID#: 1412090A-05A

EPA METHOD TO-17

File Name:	6121015	Date of Extraction: N/A	Date of Collection: 12/5/14 11:27:00 AM	
Dil. Factor:	1.00		Date of Analysis: 12/11/14 01:35 AM	
Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
TPH (Diesel Range C10-C24)	1000	10000	Not Detected	Not Detected

Air Sample Volume(L): 0.100

Container Type: TO-17 VI Tube

Client Sample ID: DUPLICATE (100 mL)

Lab ID#: 1412090A-07A

EPA METHOD TO-17

PARAMETER 10: 1				
File Name:	6121021	Date of Extraction: NA	Date of Collection: 12/4/14	
Dil. Factor:	1.00	Date of Analysis: 12/11/14 05:29 AM		
Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
TPH (Diesel Range C10-C24)	1000	10000	Not Detected	Not Detected

Air Sample Volume(L): 0.100

Container Type: TO-17 VI Tube

Client Sample ID: Lab Blank

Lab ID#: 1412090A-08A

EPA METHOD TO-17

EXTRACTED TO 1				
File Name:	6121010a	Date of Extraction: NA	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 12/10/14 09:42 PM		
Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
TPH (Diesel Range C10-C24)	1000	10000	Not Detected	Not Detected

Air Sample Volume(L): 0.100

Container Type: NA - Not Applicable

Client Sample ID: CCV

Lab ID#: 1412090A-09A

EPA METHOD TO-17

File Name:	6121006	Date of Extraction: NA	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/10/14 06:03 PM	

Compound	%Recovery
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TPH (Diesel Range C10-C24)	119
----------------------------	-----

Air Sample Volume(L): 1.00

Container Type: NA - Not Applicable

Client Sample ID: LCS

Lab ID#: 1412090A-10A

EPA METHOD TO-17

File Name:	6121008	Date of Extraction: NA	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/10/14 08:30 PM	

Compound	%Recovery	Method Limits
TPH (Diesel Range C10-C24)	127	60-140

Air Sample Volume(L): 1.00

Container Type: NA - Not Applicable

Client Sample ID: LCSD

Lab ID#: 1412090A-10AA

EPA METHOD TO-17

File Name:	6121009	Date of Extraction: NA	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/10/14 09:06 PM	

Compound	%Recovery	Method Limits
TPH (Diesel Range C10-C24)	123	60-140

Air Sample Volume(L): 1.00

Container Type: NA - Not Applicable

TO-17 SAMPLE COLLECTION



CHAIN-OF-CUSTODY RECORD

Sample Transportation Notice

Relinquishing signature on this document indicates that sample is being shipped in compliance with all applicable local, State, Federal, national, and international laws, regulations and ordinances of any kind. Air Toxics Limited assumes no liability with respect to the collection, handling or shipping of these samples. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Air Toxics Limited against any claim, demand, or action, of any kind, related to the collection, handling, or shipping of samples. D.O.T. Hotline (800) 467-4922.

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Page 2 of 2

Project Manager Lynne Fenley

Collected by: (Print and Sign) Brian Marum

Company Arcadis

Address 111 SW Columbia St. Ste 670

Phone 503-220-8201

Fax 503-220-8209

Email lynne.fenley@arcadis-usa.com

P.O. # 80046601.0008.00260

Project # 354392

Turn Around Time:		Reporting Units:	
<input checked="" type="checkbox"/> Normal	<input type="checkbox"/> ppmv	<input type="checkbox"/> ppbv	<input type="checkbox"/> mg/m3
<input type="checkbox"/> Rush	<input type="checkbox"/> mg/m3	<input type="checkbox"/> mg/m3	<input type="checkbox"/> mg/m3

Lab I.D.	Field Sample I.D. (Location)	Engraved or Stamped Tube #	Date of Collection (mm/dd/yy)	Start Time (hr:min)	End Time (hr:min)	Pre-Test Flow Rate	Post-Test Flow Rate Vols (LPPD)	Volume (mL)	Indoor/Outdoor % RH	Indoor/Outdoor Temp	Indoor Air	Outdoor Air	Soil Vapor	Other (Sub/Slab Vapor)
49 710 SS VP-6	(30mL)	60132026	12/4/14	-	10:27	-	157	30	-	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
49 710 SS VP-6	(100mL)	60145590	12/4/14	-	10:25	-	157	100	-	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
15 2214 SS VP-7	(30mL)	60145507	12/4/14	-	17:21	-	201	30	-	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
15 2214 SS VP-7	(100mL)	60143423	12/4/14	-	17:17	-	201	100	-	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
49 710 SS VP-7	(100mL)	60143423	12/5/15	-	11:27	-	-	-	-	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
49 710 EQUIPMENT BLANK	(30mL)	60141315	-	-	-	-	63	30	-	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
49 710 DUPLICATE	(100mL)	60132038	-	-	-	-	63	100	-	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Relinquished by: (signature)	Date/Time	Received by: (signature)	Date/Time	Notes: 10-17 for TPHd Analysis on hold pending corresponding 10-15 results. Do not proceed without approval from Arcadis										
Relinquished by: (signature)	Date/Time	Received by: (signature)	Date/Time	copy Brian Marum@arcadis-us.com and Eric.Epple@arcadis-us.com										
Relinquished by: (signature)	Date/Time	Received by: (signature)	Date/Time	Work Order # 1412090										
Lab Use Only	Shipper Name	Air Bill #	Temp (°C) / (°F)	Condition	Custody Seals Intact?	Yes	No	None						

12/20/2014

Mr. Eric Epple
Arcadis U.S., Inc.
1100 Olive Way
Ste 800
Seattle WA 98101

Project Name: 354972
Project #: B0046601.0008.00260
Workorder #: 1412119A

Dear Mr. Eric Epple

The following report includes the data for the above referenced project for sample(s) received on 12/6/2014 at Air Toxics Ltd.

The data and associated QC analyzed by TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Kelly Buettner
Project Manager

WORK ORDER #: 1412119A

Work Order Summary

CLIENT:	Mr. Eric Epple Arcadis U.S., Inc. 1100 Olive Way Ste 800 Seattle, WA 98101	BILL TO:	Accounts Payable Arcadis U.S., Inc. 630 Plaza Drive Suite 600 Highlands Ranch, CO 80129
PHONE:	206-726-4755	P.O. #	B0046601.0008
FAX:	206-325-8218	PROJECT #	B0046601.0008.00260 354972
DATE RECEIVED:	12/06/2014	CONTACT:	Kelly Buettner
DATE COMPLETED:	12/20/2014		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>	<u>RECEIPT VAC./PRES.</u>	<u>FINAL PRESSURE</u>
01A	SSVP-1	TO-15	4.9 "Hg	15.1 psi
02A	SSVP-2	TO-15	5.3 "Hg	14.8 psi
03A	SSVP-3	TO-15	3.5 "Hg	14.7 psi
04A	SSVP-4	TO-15	5.9 "Hg	15 psi
05A	SSVP-5	TO-15	3.5 "Hg	14.9 psi
06A	SSVP-6	TO-15	3.1 "Hg	14.8 psi
07A	SSVP-7	TO-15	3.7 "Hg	15.3 psi
08A	DUPLICATE	TO-15	4.1 "Hg	15.4 psi
09A	EQUIPMENT BLANK	TO-15	2.8 "Hg	14.9 psi
10A	Lab Blank	TO-15	NA	NA
10B	Lab Blank	TO-15	NA	NA
11A	CCV	TO-15	NA	NA
11B	CCV	TO-15	NA	NA
12A	LCS	TO-15	NA	NA
12AA	LCSD	TO-15	NA	NA
12B	LCS	TO-15	NA	NA
12BB	LCSD	TO-15	NA	NA

CERTIFIED BY:



Technical Director

DATE: 12/20/14

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704343-14-7, UT NELAP CA009332014-5, VA NELAP - 460197, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2014, Expiration date: 10/17/2015.

Eurofins Air Toxics Inc. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 9563

(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
EPA Method TO-15
Arcadis U.S., Inc.
Workorder# 1412119A

Five 1 Liter Summa Canister (100% Certified) and four 1 Liter Silco Canister (100% Certified) samples were received on December 06, 2014. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

A single point calibration for TPH referenced to Gasoline was performed for each daily analytical batch. Recovery is reported as 100% in the associated results for each CCV.

All Quality Control Limit exceedances and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

Summary of Detected Compounds EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: SSV-1

Lab ID#: 1412119A-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Acetone	12	21	29	50

Client Sample ID: SSV-2

Lab ID#: 1412119A-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
2-Propanol	4.9	19	12	46

Client Sample ID: SSV-3

Lab ID#: 1412119A-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Ethanol	4.5	6.9	8.5	13
Acetone	11	23	27	54

Client Sample ID: SSV-4

Lab ID#: 1412119A-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Ethanol	5.0	15	9.5	29

Client Sample ID: SSV-5

Lab ID#: 1412119A-05A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Ethanol	4.6	7.3	8.6	14
Acetone	11	13	27	32
Toluene	1.1	1.4	4.3	5.2

Client Sample ID: SSV-6

Lab ID#: 1412119A-06A

Summary of Detected Compounds EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: SSV-6

Lab ID#: 1412119A-06A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Ethanol	4.5	11	8.4	21
Toluene	1.1	2.7	4.2	10

Client Sample ID: SSV-7

Lab ID#: 1412119A-07A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Ethanol	4.6	5.2	8.7	9.8
Acetone	12	13	28	30

Client Sample ID: DUPLICATE

Lab ID#: 1412119A-08A

No Detections Were Found.

Client Sample ID: EQUIPMENT BLANK

Lab ID#: 1412119A-09A

No Detections Were Found.



Air Toxics

Client Sample ID: SSVP-1

Lab ID#: 1412119A-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121615	Date of Collection:	12/5/14 10:11:00 AM
Dil. Factor:	2.42	Date of Analysis:	12/17/14 11:47 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.2	Not Detected	6.0	Not Detected
Freon 114	1.2	Not Detected	8.4	Not Detected
Chloromethane	12	Not Detected	25	Not Detected
Vinyl Chloride	1.2	Not Detected	3.1	Not Detected
1,3-Butadiene	1.2	Not Detected	2.7	Not Detected
Bromomethane	12	Not Detected	47	Not Detected
Chloroethane	4.8	Not Detected	13	Not Detected
Freon 11	1.2	Not Detected	6.8	Not Detected
Ethanol	4.8	Not Detected	9.1	Not Detected
Freon 113	1.2	Not Detected	9.3	Not Detected
1,1-Dichloroethene	1.2	Not Detected	4.8	Not Detected
Acetone	12	21	29	50
2-Propanol	4.8	Not Detected	12	Not Detected
Carbon Disulfide	4.8	Not Detected	15	Not Detected
3-Chloropropene	4.8	Not Detected	15	Not Detected
Methylene Chloride	12	Not Detected	42	Not Detected
Methyl tert-butyl ether	1.2	Not Detected	4.4	Not Detected
trans-1,2-Dichloroethene	1.2	Not Detected	4.8	Not Detected
Hexane	1.2	Not Detected	4.3	Not Detected
1,1-Dichloroethane	1.2	Not Detected	4.9	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.8	Not Detected	14	Not Detected
cis-1,2-Dichloroethene	1.2	Not Detected	4.8	Not Detected
Tetrahydrofuran	1.2	Not Detected	3.6	Not Detected
Chloroform	1.2	Not Detected	5.9	Not Detected
1,1,1-Trichloroethane	1.2	Not Detected	6.6	Not Detected
Cyclohexane	1.2	Not Detected	4.2	Not Detected
Carbon Tetrachloride	1.2	Not Detected	7.6	Not Detected
2,2,4-Trimethylpentane	1.2	Not Detected	5.6	Not Detected
Benzene	1.2	Not Detected	3.9	Not Detected
1,2-Dichloroethane	1.2	Not Detected	4.9	Not Detected
Heptane	1.2	Not Detected	5.0	Not Detected
Trichloroethene	1.2	Not Detected	6.5	Not Detected
1,2-Dichloropropane	1.2	Not Detected	5.6	Not Detected
1,4-Dioxane	4.8	Not Detected	17	Not Detected
Bromodichloromethane	1.2	Not Detected	8.1	Not Detected
cis-1,3-Dichloropropene	1.2	Not Detected	5.5	Not Detected
4-Methyl-2-pentanone	1.2	Not Detected	5.0	Not Detected
Toluene	1.2	Not Detected	4.6	Not Detected
trans-1,3-Dichloropropene	1.2	Not Detected	5.5	Not Detected
1,1,2-Trichloroethane	1.2	Not Detected	6.6	Not Detected
Tetrachloroethene	1.2	Not Detected	8.2	Not Detected
2-Hexanone	4.8	Not Detected	20	Not Detected

Client Sample ID: SSVP-1

Lab ID#: 1412119A-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121615	Date of Collection:	12/5/14 10:11:00 AM
Dil. Factor:	2.42	Date of Analysis:	12/17/14 11:47 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.2	Not Detected	10	Not Detected
1,2-Dibromoethane (EDB)	1.2	Not Detected	9.3	Not Detected
Chlorobenzene	1.2	Not Detected	5.6	Not Detected
Ethyl Benzene	1.2	Not Detected	5.2	Not Detected
m,p-Xylene	1.2	Not Detected	5.2	Not Detected
o-Xylene	1.2	Not Detected	5.2	Not Detected
Styrene	1.2	Not Detected	5.2	Not Detected
Bromoform	1.2	Not Detected	12	Not Detected
Cumene	1.2	Not Detected	5.9	Not Detected
1,1,2,2-Tetrachloroethane	1.2	Not Detected	8.3	Not Detected
Propylbenzene	1.2	Not Detected	5.9	Not Detected
4-Ethyltoluene	1.2	Not Detected	5.9	Not Detected
1,3,5-Trimethylbenzene	1.2	Not Detected	5.9	Not Detected
1,2,4-Trimethylbenzene	1.2	Not Detected	5.9	Not Detected
1,3-Dichlorobenzene	1.2	Not Detected	7.3	Not Detected
1,4-Dichlorobenzene	1.2	Not Detected	7.3	Not Detected
alpha-Chlorotoluene	1.2	Not Detected	6.3	Not Detected
1,2-Dichlorobenzene	1.2	Not Detected	7.3	Not Detected
1,2,4-Trichlorobenzene	4.8	Not Detected	36	Not Detected
Hexachlorobutadiene	4.8	Not Detected	52	Not Detected
Naphthalene	4.8	Not Detected	25	Not Detected
TPH ref. to Gasoline (MW=100)	60	Not Detected	250	Not Detected

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	94	70-130
1,2-Dichloroethane-d4	102	70-130
4-Bromofluorobenzene	98	70-130



Air Toxics

Client Sample ID: SSVP-2

Lab ID#: 1412119A-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121616	Date of Collection:	12/5/14 11:10:00 AM
Dil. Factor:	2.44	Date of Analysis:	12/17/14 12:41 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.2	Not Detected	6.0	Not Detected
Freon 114	1.2	Not Detected	8.5	Not Detected
Chloromethane	12	Not Detected	25	Not Detected
Vinyl Chloride	1.2	Not Detected	3.1	Not Detected
1,3-Butadiene	1.2	Not Detected	2.7	Not Detected
Bromomethane	12	Not Detected	47	Not Detected
Chloroethane	4.9	Not Detected	13	Not Detected
Freon 11	1.2	Not Detected	6.8	Not Detected
Ethanol	4.9	Not Detected	9.2	Not Detected
Freon 113	1.2	Not Detected	9.4	Not Detected
1,1-Dichloroethene	1.2	Not Detected	4.8	Not Detected
Acetone	12	Not Detected	29	Not Detected
2-Propanol	4.9	19	12	46
Carbon Disulfide	4.9	Not Detected	15	Not Detected
3-Chloropropene	4.9	Not Detected	15	Not Detected
Methylene Chloride	12	Not Detected	42	Not Detected
Methyl tert-butyl ether	1.2	Not Detected	4.4	Not Detected
trans-1,2-Dichloroethene	1.2	Not Detected	4.8	Not Detected
Hexane	1.2	Not Detected	4.3	Not Detected
1,1-Dichloroethane	1.2	Not Detected	4.9	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.9	Not Detected	14	Not Detected
cis-1,2-Dichloroethene	1.2	Not Detected	4.8	Not Detected
Tetrahydrofuran	1.2	Not Detected	3.6	Not Detected
Chloroform	1.2	Not Detected	6.0	Not Detected
1,1,1-Trichloroethane	1.2	Not Detected	6.6	Not Detected
Cyclohexane	1.2	Not Detected	4.2	Not Detected
Carbon Tetrachloride	1.2	Not Detected	7.7	Not Detected
2,2,4-Trimethylpentane	1.2	Not Detected	5.7	Not Detected
Benzene	1.2	Not Detected	3.9	Not Detected
1,2-Dichloroethane	1.2	Not Detected	4.9	Not Detected
Heptane	1.2	Not Detected	5.0	Not Detected
Trichloroethene	1.2	Not Detected	6.6	Not Detected
1,2-Dichloropropane	1.2	Not Detected	5.6	Not Detected
1,4-Dioxane	4.9	Not Detected	18	Not Detected
Bromodichloromethane	1.2	Not Detected	8.2	Not Detected
cis-1,3-Dichloropropene	1.2	Not Detected	5.5	Not Detected
4-Methyl-2-pentanone	1.2	Not Detected	5.0	Not Detected
Toluene	1.2	Not Detected	4.6	Not Detected
trans-1,3-Dichloropropene	1.2	Not Detected	5.5	Not Detected
1,1,2-Trichloroethane	1.2	Not Detected	6.6	Not Detected
Tetrachloroethene	1.2	Not Detected	8.3	Not Detected
2-Hexanone	4.9	Not Detected	20	Not Detected

Client Sample ID: SSVP-2

Lab ID#: 1412119A-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121616	Date of Collection:	12/5/14 11:10:00 AM
Dil. Factor:	2.44	Date of Analysis:	12/17/14 12:41 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.2	Not Detected	10	Not Detected
1,2-Dibromoethane (EDB)	1.2	Not Detected	9.4	Not Detected
Chlorobenzene	1.2	Not Detected	5.6	Not Detected
Ethyl Benzene	1.2	Not Detected	5.3	Not Detected
m,p-Xylene	1.2	Not Detected	5.3	Not Detected
o-Xylene	1.2	Not Detected	5.3	Not Detected
Styrene	1.2	Not Detected	5.2	Not Detected
Bromoform	1.2	Not Detected	13	Not Detected
Cumene	1.2	Not Detected	6.0	Not Detected
1,1,2,2-Tetrachloroethane	1.2	Not Detected	8.4	Not Detected
Propylbenzene	1.2	Not Detected	6.0	Not Detected
4-Ethyltoluene	1.2	Not Detected	6.0	Not Detected
1,3,5-Trimethylbenzene	1.2	Not Detected	6.0	Not Detected
1,2,4-Trimethylbenzene	1.2	Not Detected	6.0	Not Detected
1,3-Dichlorobenzene	1.2	Not Detected	7.3	Not Detected
1,4-Dichlorobenzene	1.2	Not Detected	7.3	Not Detected
alpha-Chlorotoluene	1.2	Not Detected	6.3	Not Detected
1,2-Dichlorobenzene	1.2	Not Detected	7.3	Not Detected
1,2,4-Trichlorobenzene	4.9	Not Detected	36	Not Detected
Hexachlorobutadiene	4.9	Not Detected	52	Not Detected
Naphthalene	4.9	Not Detected	26	Not Detected
TPH ref. to Gasoline (MW=100)	61	Not Detected	250	Not Detected

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	102	70-130
4-Bromofluorobenzene	93	70-130



Air Toxics

Client Sample ID: SSVP-3

Lab ID#: 1412119A-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121617	Date of Collection:	12/4/14 3:15:00 PM
Dil. Factor:	2.26	Date of Analysis:	12/17/14 01:24 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.1	Not Detected	5.6	Not Detected
Freon 114	1.1	Not Detected	7.9	Not Detected
Chloromethane	11	Not Detected	23	Not Detected
Vinyl Chloride	1.1	Not Detected	2.9	Not Detected
1,3-Butadiene	1.1	Not Detected	2.5	Not Detected
Bromomethane	11	Not Detected	44	Not Detected
Chloroethane	4.5	Not Detected	12	Not Detected
Freon 11	1.1	Not Detected	6.3	Not Detected
Ethanol	4.5	6.9	8.5	13
Freon 113	1.1	Not Detected	8.7	Not Detected
1,1-Dichloroethene	1.1	Not Detected	4.5	Not Detected
Acetone	11	23	27	54
2-Propanol	4.5	Not Detected	11	Not Detected
Carbon Disulfide	4.5	Not Detected	14	Not Detected
3-Chloropropene	4.5	Not Detected	14	Not Detected
Methylene Chloride	11	Not Detected	39	Not Detected
Methyl tert-butyl ether	1.1	Not Detected	4.1	Not Detected
trans-1,2-Dichloroethene	1.1	Not Detected	4.5	Not Detected
Hexane	1.1	Not Detected	4.0	Not Detected
1,1-Dichloroethane	1.1	Not Detected	4.6	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.5	Not Detected	13	Not Detected
cis-1,2-Dichloroethene	1.1	Not Detected	4.5	Not Detected
Tetrahydrofuran	1.1	Not Detected	3.3	Not Detected
Chloroform	1.1	Not Detected	5.5	Not Detected
1,1,1-Trichloroethane	1.1	Not Detected	6.2	Not Detected
Cyclohexane	1.1	Not Detected	3.9	Not Detected
Carbon Tetrachloride	1.1	Not Detected	7.1	Not Detected
2,2,4-Trimethylpentane	1.1	Not Detected	5.3	Not Detected
Benzene	1.1	Not Detected	3.6	Not Detected
1,2-Dichloroethane	1.1	Not Detected	4.6	Not Detected
Heptane	1.1	Not Detected	4.6	Not Detected
Trichloroethene	1.1	Not Detected	6.1	Not Detected
1,2-Dichloropropane	1.1	Not Detected	5.2	Not Detected
1,4-Dioxane	4.5	Not Detected	16	Not Detected
Bromodichloromethane	1.1	Not Detected	7.6	Not Detected
cis-1,3-Dichloropropene	1.1	Not Detected	5.1	Not Detected
4-Methyl-2-pentanone	1.1	Not Detected	4.6	Not Detected
Toluene	1.1	Not Detected	4.2	Not Detected
trans-1,3-Dichloropropene	1.1	Not Detected	5.1	Not Detected
1,1,2-Trichloroethane	1.1	Not Detected	6.2	Not Detected
Tetrachloroethene	1.1	Not Detected	7.7	Not Detected
2-Hexanone	4.5	Not Detected	18	Not Detected



Air Toxics

Client Sample ID: SSVP-3

Lab ID#: 1412119A-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121617	Date of Collection:	12/4/14 3:15:00 PM
Dil. Factor:	2.26	Date of Analysis:	12/17/14 01:24 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.1	Not Detected	9.6	Not Detected
1,2-Dibromoethane (EDB)	1.1	Not Detected	8.7	Not Detected
Chlorobenzene	1.1	Not Detected	5.2	Not Detected
Ethyl Benzene	1.1	Not Detected	4.9	Not Detected
m,p-Xylene	1.1	Not Detected	4.9	Not Detected
o-Xylene	1.1	Not Detected	4.9	Not Detected
Styrene	1.1	Not Detected	4.8	Not Detected
Bromoform	1.1	Not Detected	12	Not Detected
Cumene	1.1	Not Detected	5.6	Not Detected
1,1,2,2-Tetrachloroethane	1.1	Not Detected	7.8	Not Detected
Propylbenzene	1.1	Not Detected	5.6	Not Detected
4-Ethyltoluene	1.1	Not Detected	5.6	Not Detected
1,3,5-Trimethylbenzene	1.1	Not Detected	5.6	Not Detected
1,2,4-Trimethylbenzene	1.1	Not Detected	5.6	Not Detected
1,3-Dichlorobenzene	1.1	Not Detected	6.8	Not Detected
1,4-Dichlorobenzene	1.1	Not Detected	6.8	Not Detected
alpha-Chlorotoluene	1.1	Not Detected	5.8	Not Detected
1,2-Dichlorobenzene	1.1	Not Detected	6.8	Not Detected
1,2,4-Trichlorobenzene	4.5	Not Detected	34	Not Detected
Hexachlorobutadiene	4.5	Not Detected	48	Not Detected
Naphthalene	4.5	Not Detected	24	Not Detected
TPH ref. to Gasoline (MW=100)	56	Not Detected	230	Not Detected

Container Type: 1 Liter Silco Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	100	70-130
4-Bromofluorobenzene	97	70-130



Air Toxics

Client Sample ID: SSVP-4

Lab ID#: 1412119A-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121618	Date of Collection:	12/4/14 1:26:00 PM
Dil. Factor:	2.52	Date of Analysis:	12/17/14 02:09 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.3	Not Detected	6.2	Not Detected
Freon 114	1.3	Not Detected	8.8	Not Detected
Chloromethane	13	Not Detected	26	Not Detected
Vinyl Chloride	1.3	Not Detected	3.2	Not Detected
1,3-Butadiene	1.3	Not Detected	2.8	Not Detected
Bromomethane	13	Not Detected	49	Not Detected
Chloroethane	5.0	Not Detected	13	Not Detected
Freon 11	1.3	Not Detected	7.1	Not Detected
Ethanol	5.0	15	9.5	29
Freon 113	1.3	Not Detected	9.6	Not Detected
1,1-Dichloroethene	1.3	Not Detected	5.0	Not Detected
Acetone	13	Not Detected	30	Not Detected
2-Propanol	5.0	Not Detected	12	Not Detected
Carbon Disulfide	5.0	Not Detected	16	Not Detected
3-Chloropropene	5.0	Not Detected	16	Not Detected
Methylene Chloride	13	Not Detected	44	Not Detected
Methyl tert-butyl ether	1.3	Not Detected	4.5	Not Detected
trans-1,2-Dichloroethene	1.3	Not Detected	5.0	Not Detected
Hexane	1.3	Not Detected	4.4	Not Detected
1,1-Dichloroethane	1.3	Not Detected	5.1	Not Detected
2-Butanone (Methyl Ethyl Ketone)	5.0	Not Detected	15	Not Detected
cis-1,2-Dichloroethene	1.3	Not Detected	5.0	Not Detected
Tetrahydrofuran	1.3	Not Detected	3.7	Not Detected
Chloroform	1.3	Not Detected	6.2	Not Detected
1,1,1-Trichloroethane	1.3	Not Detected	6.9	Not Detected
Cyclohexane	1.3	Not Detected	4.3	Not Detected
Carbon Tetrachloride	1.3	Not Detected	7.9	Not Detected
2,2,4-Trimethylpentane	1.3	Not Detected	5.9	Not Detected
Benzene	1.3	Not Detected	4.0	Not Detected
1,2-Dichloroethane	1.3	Not Detected	5.1	Not Detected
Heptane	1.3	Not Detected	5.2	Not Detected
Trichloroethene	1.3	Not Detected	6.8	Not Detected
1,2-Dichloropropane	1.3	Not Detected	5.8	Not Detected
1,4-Dioxane	5.0	Not Detected	18	Not Detected
Bromodichloromethane	1.3	Not Detected	8.4	Not Detected
cis-1,3-Dichloropropene	1.3	Not Detected	5.7	Not Detected
4-Methyl-2-pentanone	1.3	Not Detected	5.2	Not Detected
Toluene	1.3	Not Detected	4.7	Not Detected
trans-1,3-Dichloropropene	1.3	Not Detected	5.7	Not Detected
1,1,2-Trichloroethane	1.3	Not Detected	6.9	Not Detected
Tetrachloroethene	1.3	Not Detected	8.5	Not Detected
2-Hexanone	5.0	Not Detected	21	Not Detected

Client Sample ID: SSVP-4

Lab ID#: 1412119A-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121618	Date of Collection:	12/4/14 1:26:00 PM
Dil. Factor:	2.52	Date of Analysis:	12/17/14 02:09 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.3	Not Detected	11	Not Detected
1,2-Dibromoethane (EDB)	1.3	Not Detected	9.7	Not Detected
Chlorobenzene	1.3	Not Detected	5.8	Not Detected
Ethyl Benzene	1.3	Not Detected	5.5	Not Detected
m,p-Xylene	1.3	Not Detected	5.5	Not Detected
o-Xylene	1.3	Not Detected	5.5	Not Detected
Styrene	1.3	Not Detected	5.4	Not Detected
Bromoform	1.3	Not Detected	13	Not Detected
Cumene	1.3	Not Detected	6.2	Not Detected
1,1,2,2-Tetrachloroethane	1.3	Not Detected	8.6	Not Detected
Propylbenzene	1.3	Not Detected	6.2	Not Detected
4-Ethyltoluene	1.3	Not Detected	6.2	Not Detected
1,3,5-Trimethylbenzene	1.3	Not Detected	6.2	Not Detected
1,2,4-Trimethylbenzene	1.3	Not Detected	6.2	Not Detected
1,3-Dichlorobenzene	1.3	Not Detected	7.6	Not Detected
1,4-Dichlorobenzene	1.3	Not Detected	7.6	Not Detected
alpha-Chlorotoluene	1.3	Not Detected	6.5	Not Detected
1,2-Dichlorobenzene	1.3	Not Detected	7.6	Not Detected
1,2,4-Trichlorobenzene	5.0	Not Detected	37	Not Detected
Hexachlorobutadiene	5.0	Not Detected	54	Not Detected
Naphthalene	5.0	Not Detected	26	Not Detected
TPH ref. to Gasoline (MW=100)	63	Not Detected	260	Not Detected

Container Type: 1 Liter Silco Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	96	70-130
1,2-Dichloroethane-d4	99	70-130
4-Bromofluorobenzene	100	70-130



Air Toxics

Client Sample ID: SSVP-5

Lab ID#: 1412119A-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121807	Date of Collection:	12/4/14 2:22:00 PM
Dil. Factor:	2.28	Date of Analysis:	12/18/14 02:52 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.1	Not Detected	5.6	Not Detected
Freon 114	1.1	Not Detected	8.0	Not Detected
Chloromethane	11	Not Detected	24	Not Detected
Vinyl Chloride	1.1	Not Detected	2.9	Not Detected
1,3-Butadiene	1.1	Not Detected	2.5	Not Detected
Bromomethane	11	Not Detected	44	Not Detected
Chloroethane	4.6	Not Detected	12	Not Detected
Freon 11	1.1	Not Detected	6.4	Not Detected
Ethanol	4.6	7.3	8.6	14
Freon 113	1.1	Not Detected	8.7	Not Detected
1,1-Dichloroethene	1.1	Not Detected	4.5	Not Detected
Acetone	11	13	27	32
2-Propanol	4.6	Not Detected	11	Not Detected
Carbon Disulfide	4.6	Not Detected	14	Not Detected
3-Chloropropene	4.6	Not Detected	14	Not Detected
Methylene Chloride	11	Not Detected	40	Not Detected
Methyl tert-butyl ether	1.1	Not Detected	4.1	Not Detected
trans-1,2-Dichloroethene	1.1	Not Detected	4.5	Not Detected
Hexane	1.1	Not Detected	4.0	Not Detected
1,1-Dichloroethane	1.1	Not Detected	4.6	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.6	Not Detected	13	Not Detected
cis-1,2-Dichloroethene	1.1	Not Detected	4.5	Not Detected
Tetrahydrofuran	1.1	Not Detected	3.4	Not Detected
Chloroform	1.1	Not Detected	5.6	Not Detected
1,1,1-Trichloroethane	1.1	Not Detected	6.2	Not Detected
Cyclohexane	1.1	Not Detected	3.9	Not Detected
Carbon Tetrachloride	1.1	Not Detected	7.2	Not Detected
2,2,4-Trimethylpentane	1.1	Not Detected	5.3	Not Detected
Benzene	1.1	Not Detected	3.6	Not Detected
1,2-Dichloroethane	1.1	Not Detected	4.6	Not Detected
Heptane	1.1	Not Detected	4.7	Not Detected
Trichloroethene	1.1	Not Detected	6.1	Not Detected
1,2-Dichloropropane	1.1	Not Detected	5.3	Not Detected
1,4-Dioxane	4.6	Not Detected	16	Not Detected
Bromodichloromethane	1.1	Not Detected	7.6	Not Detected
cis-1,3-Dichloropropene	1.1	Not Detected	5.2	Not Detected
4-Methyl-2-pentanone	1.1	Not Detected	4.7	Not Detected
Toluene	1.1	1.4	4.3	5.2
trans-1,3-Dichloropropene	1.1	Not Detected	5.2	Not Detected
1,1,2-Trichloroethane	1.1	Not Detected	6.2	Not Detected
Tetrachloroethene	1.1	Not Detected	7.7	Not Detected
2-Hexanone	4.6	Not Detected	19	Not Detected

Client Sample ID: SSVP-5

Lab ID#: 1412119A-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121807	Date of Collection:	12/4/14 2:22:00 PM
Dil. Factor:	2.28	Date of Analysis:	12/18/14 02:52 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.1	Not Detected	9.7	Not Detected
1,2-Dibromoethane (EDB)	1.1	Not Detected	8.8	Not Detected
Chlorobenzene	1.1	Not Detected	5.2	Not Detected
Ethyl Benzene	1.1	Not Detected	4.9	Not Detected
m,p-Xylene	1.1	Not Detected	5.0	Not Detected
o-Xylene	1.1	Not Detected	5.0	Not Detected
Styrene	1.1	Not Detected	4.8	Not Detected
Bromoform	1.1	Not Detected	12	Not Detected
Cumene	1.1	Not Detected	5.6	Not Detected
1,1,2,2-Tetrachloroethane	1.1	Not Detected	7.8	Not Detected
Propylbenzene	1.1	Not Detected	5.6	Not Detected
4-Ethyltoluene	1.1	Not Detected	5.6	Not Detected
1,3,5-Trimethylbenzene	1.1	Not Detected	5.6	Not Detected
1,2,4-Trimethylbenzene	1.1	Not Detected	5.6	Not Detected
1,3-Dichlorobenzene	1.1	Not Detected	6.8	Not Detected
1,4-Dichlorobenzene	1.1	Not Detected	6.8	Not Detected
alpha-Chlorotoluene	1.1	Not Detected	5.9	Not Detected
1,2-Dichlorobenzene	1.1	Not Detected	6.8	Not Detected
1,2,4-Trichlorobenzene	4.6	Not Detected	34	Not Detected
Hexachlorobutadiene	4.6	Not Detected	49	Not Detected
Naphthalene	4.6	Not Detected	24	Not Detected
TPH ref. to Gasoline (MW=100)	57	Not Detected	230	Not Detected

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	104	70-130
4-Bromofluorobenzene	96	70-130



Air Toxics

Client Sample ID: SSVP-6

Lab ID#: 1412119A-06A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121808	Date of Collection:	12/4/14 10:17:00 AM
Dil. Factor:	2.23	Date of Analysis:	12/18/14 04:18 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.1	Not Detected	5.5	Not Detected
Freon 114	1.1	Not Detected	7.8	Not Detected
Chloromethane	11	Not Detected	23	Not Detected
Vinyl Chloride	1.1	Not Detected	2.8	Not Detected
1,3-Butadiene	1.1	Not Detected	2.5	Not Detected
Bromomethane	11	Not Detected	43	Not Detected
Chloroethane	4.5	Not Detected	12	Not Detected
Freon 11	1.1	Not Detected	6.3	Not Detected
Ethanol	4.5	11	8.4	21
Freon 113	1.1	Not Detected	8.5	Not Detected
1,1-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Acetone	11	Not Detected	26	Not Detected
2-Propanol	4.5	Not Detected	11	Not Detected
Carbon Disulfide	4.5	Not Detected	14	Not Detected
3-Chloropropene	4.5	Not Detected	14	Not Detected
Methylene Chloride	11	Not Detected	39	Not Detected
Methyl tert-butyl ether	1.1	Not Detected	4.0	Not Detected
trans-1,2-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Hexane	1.1	Not Detected	3.9	Not Detected
1,1-Dichloroethane	1.1	Not Detected	4.5	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.5	Not Detected	13	Not Detected
cis-1,2-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Tetrahydrofuran	1.1	Not Detected	3.3	Not Detected
Chloroform	1.1	Not Detected	5.4	Not Detected
1,1,1-Trichloroethane	1.1	Not Detected	6.1	Not Detected
Cyclohexane	1.1	Not Detected	3.8	Not Detected
Carbon Tetrachloride	1.1	Not Detected	7.0	Not Detected
2,2,4-Trimethylpentane	1.1	Not Detected	5.2	Not Detected
Benzene	1.1	Not Detected	3.6	Not Detected
1,2-Dichloroethane	1.1	Not Detected	4.5	Not Detected
Heptane	1.1	Not Detected	4.6	Not Detected
Trichloroethene	1.1	Not Detected	6.0	Not Detected
1,2-Dichloropropane	1.1	Not Detected	5.2	Not Detected
1,4-Dioxane	4.5	Not Detected	16	Not Detected
Bromodichloromethane	1.1	Not Detected	7.5	Not Detected
cis-1,3-Dichloropropene	1.1	Not Detected	5.1	Not Detected
4-Methyl-2-pentanone	1.1	Not Detected	4.6	Not Detected
Toluene	1.1	2.7	4.2	10
trans-1,3-Dichloropropene	1.1	Not Detected	5.1	Not Detected
1,1,2-Trichloroethane	1.1	Not Detected	6.1	Not Detected
Tetrachloroethene	1.1	Not Detected	7.6	Not Detected
2-Hexanone	4.5	Not Detected	18	Not Detected

Client Sample ID: SSVP-6

Lab ID#: 1412119A-06A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121808	Date of Collection:	12/4/14 10:17:00 AM
Dil. Factor:	2.23	Date of Analysis:	12/18/14 04:18 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.1	Not Detected	9.5	Not Detected
1,2-Dibromoethane (EDB)	1.1	Not Detected	8.6	Not Detected
Chlorobenzene	1.1	Not Detected	5.1	Not Detected
Ethyl Benzene	1.1	Not Detected	4.8	Not Detected
m,p-Xylene	1.1	Not Detected	4.8	Not Detected
o-Xylene	1.1	Not Detected	4.8	Not Detected
Styrene	1.1	Not Detected	4.7	Not Detected
Bromoform	1.1	Not Detected	12	Not Detected
Cumene	1.1	Not Detected	5.5	Not Detected
1,1,2,2-Tetrachloroethane	1.1	Not Detected	7.6	Not Detected
Propylbenzene	1.1	Not Detected	5.5	Not Detected
4-Ethyltoluene	1.1	Not Detected	5.5	Not Detected
1,3,5-Trimethylbenzene	1.1	Not Detected	5.5	Not Detected
1,2,4-Trimethylbenzene	1.1	Not Detected	5.5	Not Detected
1,3-Dichlorobenzene	1.1	Not Detected	6.7	Not Detected
1,4-Dichlorobenzene	1.1	Not Detected	6.7	Not Detected
alpha-Chlorotoluene	1.1	Not Detected	5.8	Not Detected
1,2-Dichlorobenzene	1.1	Not Detected	6.7	Not Detected
1,2,4-Trichlorobenzene	4.5	Not Detected	33	Not Detected
Hexachlorobutadiene	4.5	Not Detected	48	Not Detected
Naphthalene	4.5	Not Detected	23	Not Detected
TPH ref. to Gasoline (MW=100)	56	Not Detected	230	Not Detected

Container Type: 1 Liter Silco Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	101	70-130
1,2-Dichloroethane-d4	101	70-130
4-Bromofluorobenzene	95	70-130



Air Toxics

Client Sample ID: SSVP-7

Lab ID#: 1412119A-07A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121809	Date of Collection:	12/4/14 5:13:00 PM
Dil. Factor:	2.32	Date of Analysis:	12/18/14 05:20 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.2	Not Detected	5.7	Not Detected
Freon 114	1.2	Not Detected	8.1	Not Detected
Chloromethane	12	Not Detected	24	Not Detected
Vinyl Chloride	1.2	Not Detected	3.0	Not Detected
1,3-Butadiene	1.2	Not Detected	2.6	Not Detected
Bromomethane	12	Not Detected	45	Not Detected
Chloroethane	4.6	Not Detected	12	Not Detected
Freon 11	1.2	Not Detected	6.5	Not Detected
Ethanol	4.6	5.2	8.7	9.8
Freon 113	1.2	Not Detected	8.9	Not Detected
1,1-Dichloroethene	1.2	Not Detected	4.6	Not Detected
Acetone	12	13	28	30
2-Propanol	4.6	Not Detected	11	Not Detected
Carbon Disulfide	4.6	Not Detected	14	Not Detected
3-Chloropropene	4.6	Not Detected	14	Not Detected
Methylene Chloride	12	Not Detected	40	Not Detected
Methyl tert-butyl ether	1.2	Not Detected	4.2	Not Detected
trans-1,2-Dichloroethene	1.2	Not Detected	4.6	Not Detected
Hexane	1.2	Not Detected	4.1	Not Detected
1,1-Dichloroethane	1.2	Not Detected	4.7	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.6	Not Detected	14	Not Detected
cis-1,2-Dichloroethene	1.2	Not Detected	4.6	Not Detected
Tetrahydrofuran	1.2	Not Detected	3.4	Not Detected
Chloroform	1.2	Not Detected	5.7	Not Detected
1,1,1-Trichloroethane	1.2	Not Detected	6.3	Not Detected
Cyclohexane	1.2	Not Detected	4.0	Not Detected
Carbon Tetrachloride	1.2	Not Detected	7.3	Not Detected
2,2,4-Trimethylpentane	1.2	Not Detected	5.4	Not Detected
Benzene	1.2	Not Detected	3.7	Not Detected
1,2-Dichloroethane	1.2	Not Detected	4.7	Not Detected
Heptane	1.2	Not Detected	4.8	Not Detected
Trichloroethene	1.2	Not Detected	6.2	Not Detected
1,2-Dichloropropane	1.2	Not Detected	5.4	Not Detected
1,4-Dioxane	4.6	Not Detected	17	Not Detected
Bromodichloromethane	1.2	Not Detected	7.8	Not Detected
cis-1,3-Dichloropropene	1.2	Not Detected	5.3	Not Detected
4-Methyl-2-pentanone	1.2	Not Detected	4.8	Not Detected
Toluene	1.2	Not Detected	4.4	Not Detected
trans-1,3-Dichloropropene	1.2	Not Detected	5.3	Not Detected
1,1,2-Trichloroethane	1.2	Not Detected	6.3	Not Detected
Tetrachloroethene	1.2	Not Detected	7.9	Not Detected
2-Hexanone	4.6	Not Detected	19	Not Detected

Client Sample ID: SSVP-7

Lab ID#: 1412119A-07A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121809	Date of Collection:	12/4/14 5:13:00 PM
Dil. Factor:	2.32	Date of Analysis:	12/18/14 05:20 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.2	Not Detected	9.9	Not Detected
1,2-Dibromoethane (EDB)	1.2	Not Detected	8.9	Not Detected
Chlorobenzene	1.2	Not Detected	5.3	Not Detected
Ethyl Benzene	1.2	Not Detected	5.0	Not Detected
m,p-Xylene	1.2	Not Detected	5.0	Not Detected
o-Xylene	1.2	Not Detected	5.0	Not Detected
Styrene	1.2	Not Detected	4.9	Not Detected
Bromoform	1.2	Not Detected	12	Not Detected
Cumene	1.2	Not Detected	5.7	Not Detected
1,1,2,2-Tetrachloroethane	1.2	Not Detected	8.0	Not Detected
Propylbenzene	1.2	Not Detected	5.7	Not Detected
4-Ethyltoluene	1.2	Not Detected	5.7	Not Detected
1,3,5-Trimethylbenzene	1.2	Not Detected	5.7	Not Detected
1,2,4-Trimethylbenzene	1.2	Not Detected	5.7	Not Detected
1,3-Dichlorobenzene	1.2	Not Detected	7.0	Not Detected
1,4-Dichlorobenzene	1.2	Not Detected	7.0	Not Detected
alpha-Chlorotoluene	1.2	Not Detected	6.0	Not Detected
1,2-Dichlorobenzene	1.2	Not Detected	7.0	Not Detected
1,2,4-Trichlorobenzene	4.6	Not Detected	34	Not Detected
Hexachlorobutadiene	4.6	Not Detected	49	Not Detected
Naphthalene	4.6	Not Detected	24	Not Detected
TPH ref. to Gasoline (MW=100)	58	Not Detected	240	Not Detected

Container Type: 1 Liter Silco Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	102	70-130
4-Bromofluorobenzene	97	70-130



Air Toxics

Client Sample ID: DUPLICATE

Lab ID#: 1412119A-08A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121810	Date of Collection: NA		
Dil. Factor:	2.37	Date of Analysis: 12/18/14 06:26 PM		
Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.2	Not Detected	5.9	Not Detected
Freon 114	1.2	Not Detected	8.3	Not Detected
Chloromethane	12	Not Detected	24	Not Detected
Vinyl Chloride	1.2	Not Detected	3.0	Not Detected
1,3-Butadiene	1.2	Not Detected	2.6	Not Detected
Bromomethane	12	Not Detected	46	Not Detected
Chloroethane	4.7	Not Detected	12	Not Detected
Freon 11	1.2	Not Detected	6.6	Not Detected
Ethanol	4.7	Not Detected	8.9	Not Detected
Freon 113	1.2	Not Detected	9.1	Not Detected
1,1-Dichloroethene	1.2	Not Detected	4.7	Not Detected
Acetone	12	Not Detected	28	Not Detected
2-Propanol	4.7	Not Detected	12	Not Detected
Carbon Disulfide	4.7	Not Detected	15	Not Detected
3-Chloropropene	4.7	Not Detected	15	Not Detected
Methylene Chloride	12	Not Detected	41	Not Detected
Methyl tert-butyl ether	1.2	Not Detected	4.3	Not Detected
trans-1,2-Dichloroethene	1.2	Not Detected	4.7	Not Detected
Hexane	1.2	Not Detected	4.2	Not Detected
1,1-Dichloroethane	1.2	Not Detected	4.8	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.7	Not Detected	14	Not Detected
cis-1,2-Dichloroethene	1.2	Not Detected	4.7	Not Detected
Tetrahydrofuran	1.2	Not Detected	3.5	Not Detected
Chloroform	1.2	Not Detected	5.8	Not Detected
1,1,1-Trichloroethane	1.2	Not Detected	6.5	Not Detected
Cyclohexane	1.2	Not Detected	4.1	Not Detected
Carbon Tetrachloride	1.2	Not Detected	7.4	Not Detected
2,2,4-Trimethylpentane	1.2	Not Detected	5.5	Not Detected
Benzene	1.2	Not Detected	3.8	Not Detected
1,2-Dichloroethane	1.2	Not Detected	4.8	Not Detected
Heptane	1.2	Not Detected	4.8	Not Detected
Trichloroethene	1.2	Not Detected	6.4	Not Detected
1,2-Dichloropropane	1.2	Not Detected	5.5	Not Detected
1,4-Dioxane	4.7	Not Detected	17	Not Detected
Bromodichloromethane	1.2	Not Detected	7.9	Not Detected
cis-1,3-Dichloropropene	1.2	Not Detected	5.4	Not Detected
4-Methyl-2-pentanone	1.2	Not Detected	4.8	Not Detected
Toluene	1.2	Not Detected	4.5	Not Detected
trans-1,3-Dichloropropene	1.2	Not Detected	5.4	Not Detected
1,1,2-Trichloroethane	1.2	Not Detected	6.5	Not Detected
Tetrachloroethene	1.2	Not Detected	8.0	Not Detected
2-Hexanone	4.7	Not Detected	19	Not Detected



Air Toxics

Client Sample ID: DUPLICATE

Lab ID#: 1412119A-08A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121810	Date of Collection: NA
Dil. Factor:	2.37	Date of Analysis: 12/18/14 06:26 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.2	Not Detected	10	Not Detected
1,2-Dibromoethane (EDB)	1.2	Not Detected	9.1	Not Detected
Chlorobenzene	1.2	Not Detected	5.4	Not Detected
Ethyl Benzene	1.2	Not Detected	5.1	Not Detected
m,p-Xylene	1.2	Not Detected	5.1	Not Detected
o-Xylene	1.2	Not Detected	5.1	Not Detected
Styrene	1.2	Not Detected	5.0	Not Detected
Bromoform	1.2	Not Detected	12	Not Detected
Cumene	1.2	Not Detected	5.8	Not Detected
1,1,2,2-Tetrachloroethane	1.2	Not Detected	8.1	Not Detected
Propylbenzene	1.2	Not Detected	5.8	Not Detected
4-Ethyltoluene	1.2	Not Detected	5.8	Not Detected
1,3,5-Trimethylbenzene	1.2	Not Detected	5.8	Not Detected
1,2,4-Trimethylbenzene	1.2	Not Detected	5.8	Not Detected
1,3-Dichlorobenzene	1.2	Not Detected	7.1	Not Detected
1,4-Dichlorobenzene	1.2	Not Detected	7.1	Not Detected
alpha-Chlorotoluene	1.2	Not Detected	6.1	Not Detected
1,2-Dichlorobenzene	1.2	Not Detected	7.1	Not Detected
1,2,4-Trichlorobenzene	4.7	Not Detected	35	Not Detected
Hexachlorobutadiene	4.7	Not Detected	50	Not Detected
Naphthalene	4.7	Not Detected	25	Not Detected
TPH ref. to Gasoline (MW=100)	59	Not Detected	240	Not Detected

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	102	70-130
1,2-Dichloroethane-d4	103	70-130
4-Bromofluorobenzene	98	70-130



Air Toxics

Client Sample ID: EQUIPMENT BLANK

Lab ID#: 1412119A-09A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121811	Date of Collection:	12/5/14 11:43:00 AM
Dil. Factor:	2.22	Date of Analysis:	12/18/14 08:00 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.1	Not Detected	5.5	Not Detected
Freon 114	1.1	Not Detected	7.8	Not Detected
Chloromethane	11	Not Detected	23	Not Detected
Vinyl Chloride	1.1	Not Detected	2.8	Not Detected
1,3-Butadiene	1.1	Not Detected	2.4	Not Detected
Bromomethane	11	Not Detected	43	Not Detected
Chloroethane	4.4	Not Detected	12	Not Detected
Freon 11	1.1	Not Detected	6.2	Not Detected
Ethanol	4.4	Not Detected	8.4	Not Detected
Freon 113	1.1	Not Detected	8.5	Not Detected
1,1-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Acetone	11	Not Detected	26	Not Detected
2-Propanol	4.4	Not Detected	11	Not Detected
Carbon Disulfide	4.4	Not Detected	14	Not Detected
3-Chloropropene	4.4	Not Detected	14	Not Detected
Methylene Chloride	11	Not Detected	38	Not Detected
Methyl tert-butyl ether	1.1	Not Detected	4.0	Not Detected
trans-1,2-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Hexane	1.1	Not Detected	3.9	Not Detected
1,1-Dichloroethane	1.1	Not Detected	4.5	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.4	Not Detected	13	Not Detected
cis-1,2-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Tetrahydrofuran	1.1	Not Detected	3.3	Not Detected
Chloroform	1.1	Not Detected	5.4	Not Detected
1,1,1-Trichloroethane	1.1	Not Detected	6.0	Not Detected
Cyclohexane	1.1	Not Detected	3.8	Not Detected
Carbon Tetrachloride	1.1	Not Detected	7.0	Not Detected
2,2,4-Trimethylpentane	1.1	Not Detected	5.2	Not Detected
Benzene	1.1	Not Detected	3.5	Not Detected
1,2-Dichloroethane	1.1	Not Detected	4.5	Not Detected
Heptane	1.1	Not Detected	4.5	Not Detected
Trichloroethene	1.1	Not Detected	6.0	Not Detected
1,2-Dichloropropane	1.1	Not Detected	5.1	Not Detected
1,4-Dioxane	4.4	Not Detected	16	Not Detected
Bromodichloromethane	1.1	Not Detected	7.4	Not Detected
cis-1,3-Dichloropropene	1.1	Not Detected	5.0	Not Detected
4-Methyl-2-pentanone	1.1	Not Detected	4.5	Not Detected
Toluene	1.1	Not Detected	4.2	Not Detected
trans-1,3-Dichloropropene	1.1	Not Detected	5.0	Not Detected
1,1,2-Trichloroethane	1.1	Not Detected	6.0	Not Detected
Tetrachloroethene	1.1	Not Detected	7.5	Not Detected
2-Hexanone	4.4	Not Detected	18	Not Detected



Air Toxics

Client Sample ID: EQUIPMENT BLANK

Lab ID#: 1412119A-09A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121811	Date of Collection:	12/5/14 11:43:00 AM
Dil. Factor:	2.22	Date of Analysis:	12/18/14 08:00 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.1	Not Detected	9.4	Not Detected
1,2-Dibromoethane (EDB)	1.1	Not Detected	8.5	Not Detected
Chlorobenzene	1.1	Not Detected	5.1	Not Detected
Ethyl Benzene	1.1	Not Detected	4.8	Not Detected
m,p-Xylene	1.1	Not Detected	4.8	Not Detected
o-Xylene	1.1	Not Detected	4.8	Not Detected
Styrene	1.1	Not Detected	4.7	Not Detected
Bromoform	1.1	Not Detected	11	Not Detected
Cumene	1.1	Not Detected	5.4	Not Detected
1,1,2,2-Tetrachloroethane	1.1	Not Detected	7.6	Not Detected
Propylbenzene	1.1	Not Detected	5.4	Not Detected
4-Ethyltoluene	1.1	Not Detected	5.4	Not Detected
1,3,5-Trimethylbenzene	1.1	Not Detected	5.4	Not Detected
1,2,4-Trimethylbenzene	1.1	Not Detected	5.4	Not Detected
1,3-Dichlorobenzene	1.1	Not Detected	6.7	Not Detected
1,4-Dichlorobenzene	1.1	Not Detected	6.7	Not Detected
alpha-Chlorotoluene	1.1	Not Detected	5.7	Not Detected
1,2-Dichlorobenzene	1.1	Not Detected	6.7	Not Detected
1,2,4-Trichlorobenzene	4.4	Not Detected	33	Not Detected
Hexachlorobutadiene	4.4	Not Detected	47	Not Detected
Naphthalene	4.4	Not Detected	23	Not Detected
TPH ref. to Gasoline (MW=100)	56	Not Detected	230	Not Detected

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	102	70-130
1,2-Dichloroethane-d4	103	70-130
4-Bromofluorobenzene	91	70-130



Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1412119A-10A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121610	Date of Collection:	NA	
Dil. Factor:	1.00	Date of Analysis:	12/17/14 07:25 AM	
Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.5	Not Detected
Chloromethane	5.0	Not Detected	10	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Bromomethane	5.0	Not Detected	19	Not Detected
Chloroethane	2.0	Not Detected	5.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Freon 113	0.50	Not Detected	3.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Acetone	5.0	Not Detected	12	Not Detected
2-Propanol	2.0	Not Detected	4.9	Not Detected
Carbon Disulfide	2.0	Not Detected	6.2	Not Detected
3-Chloropropene	2.0	Not Detected	6.3	Not Detected
Methylene Chloride	5.0	Not Detected	17	Not Detected
Methyl tert-butyl ether	0.50	Not Detected	1.8	Not Detected
trans-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.0	Not Detected	5.9	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Tetrahydrofuran	0.50	Not Detected	1.5	Not Detected
Chloroform	0.50	Not Detected	2.4	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.1	Not Detected
2,2,4-Trimethylpentane	0.50	Not Detected	2.3	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Heptane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
1,4-Dioxane	2.0	Not Detected	7.2	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
4-Methyl-2-pentanone	0.50	Not Detected	2.0	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
1,1,2-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
2-Hexanone	2.0	Not Detected	8.2	Not Detected



Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1412119A-10A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121610	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/17/14 07:25 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	0.50	Not Detected	4.2	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.8	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.1	Not Detected
Bromoform	0.50	Not Detected	5.2	Not Detected
Cumene	0.50	Not Detected	2.4	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.4	Not Detected
Propylbenzene	0.50	Not Detected	2.4	Not Detected
4-Ethyltoluene	0.50	Not Detected	2.4	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	21	Not Detected
Naphthalene	2.0	Not Detected	10	Not Detected
TPH ref. to Gasoline (MW=100)	25	Not Detected	100	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	102	70-130
4-Bromofluorobenzene	98	70-130



Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1412119A-10B

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121806	Date of Collection:	NA	
Dil. Factor:	1.00	Date of Analysis:	12/18/14 02:00 PM	
Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.5	Not Detected
Chloromethane	5.0	Not Detected	10	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Bromomethane	5.0	Not Detected	19	Not Detected
Chloroethane	2.0	Not Detected	5.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Freon 113	0.50	Not Detected	3.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Acetone	5.0	Not Detected	12	Not Detected
2-Propanol	2.0	Not Detected	4.9	Not Detected
Carbon Disulfide	2.0	Not Detected	6.2	Not Detected
3-Chloropropene	2.0	Not Detected	6.3	Not Detected
Methylene Chloride	5.0	Not Detected	17	Not Detected
Methyl tert-butyl ether	0.50	Not Detected	1.8	Not Detected
trans-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.0	Not Detected	5.9	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Tetrahydrofuran	0.50	Not Detected	1.5	Not Detected
Chloroform	0.50	Not Detected	2.4	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.1	Not Detected
2,2,4-Trimethylpentane	0.50	Not Detected	2.3	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Heptane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
1,4-Dioxane	2.0	Not Detected	7.2	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
4-Methyl-2-pentanone	0.50	Not Detected	2.0	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
1,1,2-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
2-Hexanone	2.0	Not Detected	8.2	Not Detected



Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1412119A-10B

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121806	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/18/14 02:00 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	0.50	Not Detected	4.2	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.8	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.1	Not Detected
Bromoform	0.50	Not Detected	5.2	Not Detected
Cumene	0.50	Not Detected	2.4	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.4	Not Detected
Propylbenzene	0.50	Not Detected	2.4	Not Detected
4-Ethyltoluene	0.50	Not Detected	2.4	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	21	Not Detected
Naphthalene	2.0	Not Detected	10	Not Detected
TPH ref. to Gasoline (MW=100)	25	Not Detected	100	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	103	70-130
4-Bromofluorobenzene	94	70-130



Air Toxics

Client Sample ID: CCV

Lab ID#: 1412119A-11A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121602	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/16/14 03:36 PM

Compound	%Recovery
Freon 12	98
Freon 114	97
Chloromethane	88
Vinyl Chloride	91
1,3-Butadiene	99
Bromomethane	92
Chloroethane	98
Freon 11	103
Ethanol	92
Freon 113	99
1,1-Dichloroethene	103
Acetone	95
2-Propanol	105
Carbon Disulfide	105
3-Chloropropene	105
Methylene Chloride	96
Methyl tert-butyl ether	102
trans-1,2-Dichloroethene	99
Hexane	101
1,1-Dichloroethane	98
2-Butanone (Methyl Ethyl Ketone)	101
cis-1,2-Dichloroethene	100
Tetrahydrofuran	106
Chloroform	102
1,1,1-Trichloroethane	101
Cyclohexane	104
Carbon Tetrachloride	103
2,2,4-Trimethylpentane	101
Benzene	98
1,2-Dichloroethane	99
Heptane	101
Trichloroethene	103
1,2-Dichloropropane	98
1,4-Dioxane	110
Bromodichloromethane	100
cis-1,3-Dichloropropene	104
4-Methyl-2-pentanone	113
Toluene	98
trans-1,3-Dichloropropene	112
1,1,2-Trichloroethane	107
Tetrachloroethene	104
2-Hexanone	118

Client Sample ID: CCV

Lab ID#: 1412119A-11A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121602	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/16/14 03:36 PM

Compound	%Recovery
Dibromochloromethane	107
1,2-Dibromoethane (EDB)	106
Chlorobenzene	104
Ethyl Benzene	111
m,p-Xylene	112
o-Xylene	110
Styrene	120
Bromoform	110
Cumene	112
1,1,2,2-Tetrachloroethane	107
Propylbenzene	116
4-Ethyltoluene	119
1,3,5-Trimethylbenzene	116
1,2,4-Trimethylbenzene	122
1,3-Dichlorobenzene	117
1,4-Dichlorobenzene	109
alpha-Chlorotoluene	126
1,2-Dichlorobenzene	114
1,2,4-Trichlorobenzene	106
Hexachlorobutadiene	118
Naphthalene	118
TPH ref. to Gasoline (MW=100)	100

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	96	70-130
4-Bromofluorobenzene	96	70-130

Client Sample ID: CCV

Lab ID#: 1412119A-11B

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121802	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/18/14 10:51 AM

Compound	%Recovery
Freon 12	91
Freon 114	91
Chloromethane	85
Vinyl Chloride	85
1,3-Butadiene	93
Bromomethane	88
Chloroethane	91
Freon 11	92
Ethanol	99
Freon 113	92
1,1-Dichloroethene	90
Acetone	86
2-Propanol	102
Carbon Disulfide	97
3-Chloropropene	99
Methylene Chloride	88
Methyl tert-butyl ether	94
trans-1,2-Dichloroethene	92
Hexane	94
1,1-Dichloroethane	90
2-Butanone (Methyl Ethyl Ketone)	95
cis-1,2-Dichloroethene	92
Tetrahydrofuran	98
Chloroform	93
1,1,1-Trichloroethane	94
Cyclohexane	95
Carbon Tetrachloride	96
2,2,4-Trimethylpentane	94
Benzene	91
1,2-Dichloroethane	92
Heptane	96
Trichloroethene	94
1,2-Dichloropropane	92
1,4-Dioxane	104
Bromodichloromethane	93
cis-1,3-Dichloropropene	96
4-Methyl-2-pentanone	105
Toluene	90
trans-1,3-Dichloropropene	96
1,1,2-Trichloroethane	92
Tetrachloroethene	90
2-Hexanone	105

Client Sample ID: CCV

Lab ID#: 1412119A-11B

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121802	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/18/14 10:51 AM

Compound	%Recovery
Dibromochloromethane	92
1,2-Dibromoethane (EDB)	94
Chlorobenzene	91
Ethyl Benzene	98
m,p-Xylene	99
o-Xylene	97
Styrene	108
Bromoform	95
Cumene	98
1,1,2,2-Tetrachloroethane	94
Propylbenzene	101
4-Ethyltoluene	103
1,3,5-Trimethylbenzene	97
1,2,4-Trimethylbenzene	103
1,3-Dichlorobenzene	104
1,4-Dichlorobenzene	99
alpha-Chlorotoluene	117
1,2-Dichlorobenzene	104
1,2,4-Trichlorobenzene	74
Hexachlorobutadiene	87
Naphthalene	108
TPH ref. to Gasoline (MW=100)	100

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	99	70-130
4-Bromofluorobenzene	105	70-130

Client Sample ID: LCS

Lab ID#: 1412119A-12A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name: 2121603

Date of Collection: NA

Dil. Factor: 1.00

Date of Analysis: 12/16/14 04:31 PM

Compound	%Recovery	Method Limits
Freon 12	83	70-130
Freon 114	83	70-130
Chloromethane	76	70-130
Vinyl Chloride	78	70-130
1,3-Butadiene	79	70-130
Bromomethane	77	70-130
Chloroethane	83	70-130
Freon 11	85	70-130
Ethanol	84	70-130
Freon 113	87	70-130
1,1-Dichloroethene	88	70-130
Acetone	84	70-130
2-Propanol	86	70-130
Carbon Disulfide	79	70-130
3-Chloropropene	82	70-130
Methylene Chloride	83	70-130
Methyl tert-butyl ether	81	70-130
trans-1,2-Dichloroethene	78	70-130
Hexane	83	70-130
1,1-Dichloroethane	80	70-130
2-Butanone (Methyl Ethyl Ketone)	82	70-130
cis-1,2-Dichloroethene	84	70-130
Tetrahydrofuran	84	70-130
Chloroform	83	70-130
1,1,1-Trichloroethane	83	70-130
Cyclohexane	85	70-130
Carbon Tetrachloride	85	70-130
2,2,4-Trimethylpentane	84	70-130
Benzene	78	70-130
1,2-Dichloroethane	78	70-130
Heptane	80	70-130
Trichloroethene	81	70-130
1,2-Dichloropropane	77	70-130
1,4-Dioxane	86	70-130
Bromodichloromethane	79	70-130
cis-1,3-Dichloropropene	86	70-130
4-Methyl-2-pentanone	81	70-130
Toluene	75	70-130
trans-1,3-Dichloropropene	88	70-130
1,1,2-Trichloroethane	84	70-130
Tetrachloroethene	85	70-130
2-Hexanone	82	70-130

Client Sample ID: LCS

Lab ID#: 1412119A-12A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121603	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/16/14 04:31 PM

Compound	%Recovery	Method Limits
Dibromochloromethane	88	70-130
1,2-Dibromoethane (EDB)	86	70-130
Chlorobenzene	85	70-130
Ethyl Benzene	91	70-130
m,p-Xylene	89	70-130
o-Xylene	88	70-130
Styrene	97	70-130
Bromoform	92	70-130
Cumene	89	70-130
1,1,2,2-Tetrachloroethane	88	70-130
Propylbenzene	94	70-130
4-Ethyltoluene	94	70-130
1,3,5-Trimethylbenzene	98	70-130
1,2,4-Trimethylbenzene	101	70-130
1,3-Dichlorobenzene	98	70-130
1,4-Dichlorobenzene	91	70-130
alpha-Chlorotoluene	171 Q	70-130
1,2-Dichlorobenzene	98	70-130
1,2,4-Trichlorobenzene	111	70-130
Hexachlorobutadiene	125	70-130
Naphthalene	78	60-140
TPH ref. to Gasoline (MW=100)	Not Spiked	

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	94	70-130
1,2-Dichloroethane-d4	98	70-130
4-Bromofluorobenzene	96	70-130

Client Sample ID: LCSD

Lab ID#: 1412119A-12AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name: 2121604

Date of Collection: NA

Dil. Factor: 1.00

Date of Analysis: 12/16/14 05:55 PM

Compound	%Recovery	Method Limits
Freon 12	78	70-130
Freon 114	78	70-130
Chloromethane	72	70-130
Vinyl Chloride	74	70-130
1,3-Butadiene	74	70-130
Bromomethane	73	70-130
Chloroethane	77	70-130
Freon 11	79	70-130
Ethanol	90	70-130
Freon 113	82	70-130
1,1-Dichloroethene	82	70-130
Acetone	79	70-130
2-Propanol	81	70-130
Carbon Disulfide	73	70-130
3-Chloropropene	77	70-130
Methylene Chloride	78	70-130
Methyl tert-butyl ether	76	70-130
trans-1,2-Dichloroethene	72	70-130
Hexane	78	70-130
1,1-Dichloroethane	76	70-130
2-Butanone (Methyl Ethyl Ketone)	77	70-130
cis-1,2-Dichloroethene	79	70-130
Tetrahydrofuran	78	70-130
Chloroform	78	70-130
1,1,1-Trichloroethane	78	70-130
Cyclohexane	81	70-130
Carbon Tetrachloride	80	70-130
2,2,4-Trimethylpentane	78	70-130
Benzene	73	70-130
1,2-Dichloroethane	72	70-130
Heptane	74	70-130
Trichloroethene	76	70-130
1,2-Dichloropropane	73	70-130
1,4-Dioxane	81	70-130
Bromodichloromethane	74	70-130
cis-1,3-Dichloropropene	81	70-130
4-Methyl-2-pentanone	76	70-130
Toluene	72	70-130
trans-1,3-Dichloropropene	79	70-130
1,1,2-Trichloroethane	78	70-130
Tetrachloroethene	78	70-130
2-Hexanone	75	70-130

Client Sample ID: LCSD

Lab ID#: 1412119A-12AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121604	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/16/14 05:55 PM

Compound	%Recovery	Method Limits
Dibromochloromethane	79	70-130
1,2-Dibromoethane (EDB)	78	70-130
Chlorobenzene	78	70-130
Ethyl Benzene	80	70-130
m,p-Xylene	79	70-130
o-Xylene	78	70-130
Styrene	86	70-130
Bromoform	84	70-130
Cumene	80	70-130
1,1,2,2-Tetrachloroethane	79	70-130
Propylbenzene	82	70-130
4-Ethyltoluene	82	70-130
1,3,5-Trimethylbenzene	84	70-130
1,2,4-Trimethylbenzene	85	70-130
1,3-Dichlorobenzene	85	70-130
1,4-Dichlorobenzene	80	70-130
alpha-Chlorotoluene	151 Q	70-130
1,2-Dichlorobenzene	86	70-130
1,2,4-Trichlorobenzene	96	70-130
Hexachlorobutadiene	110	70-130
Naphthalene	67	60-140
TPH ref. to Gasoline (MW=100)	Not Spiked	

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	98	70-130
4-Bromofluorobenzene	94	70-130



Air Toxics

Client Sample ID: LCS

Lab ID#: 1412119A-12B

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121803	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/18/14 11:36 AM

Compound	%Recovery	Method Limits
Freon 12	86	70-130
Freon 114	86	70-130
Chloromethane	80	70-130
Vinyl Chloride	82	70-130
1,3-Butadiene	84	70-130
Bromomethane	83	70-130
Chloroethane	87	70-130
Freon 11	86	70-130
Ethanol	94	70-130
Freon 113	90	70-130
1,1-Dichloroethene	87	70-130
Acetone	82	70-130
2-Propanol	101	70-130
Carbon Disulfide	84	70-130
3-Chloropropene	85	70-130
Methylene Chloride	80	70-130
Methyl tert-butyl ether	86	70-130
trans-1,2-Dichloroethene	81	70-130
Hexane	86	70-130
1,1-Dichloroethane	84	70-130
2-Butanone (Methyl Ethyl Ketone)	86	70-130
cis-1,2-Dichloroethene	88	70-130
Tetrahydrofuran	90	70-130
Chloroform	86	70-130
1,1,1-Trichloroethane	85	70-130
Cyclohexane	88	70-130
Carbon Tetrachloride	89	70-130
2,2,4-Trimethylpentane	87	70-130
Benzene	85	70-130
1,2-Dichloroethane	88	70-130
Heptane	89	70-130
Trichloroethene	90	70-130
1,2-Dichloropropane	86	70-130
1,4-Dioxane	98	70-130
Bromodichloromethane	88	70-130
cis-1,3-Dichloropropene	97	70-130
4-Methyl-2-pentanone	98	70-130
Toluene	84	70-130
trans-1,3-Dichloropropene	90	70-130
1,1,2-Trichloroethane	89	70-130
Tetrachloroethene	86	70-130
2-Hexanone	102	70-130



Air Toxics

Client Sample ID: LCS

Lab ID#: 1412119A-12B

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121803	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/18/14 11:36 AM

Compound	%Recovery	Method Limits
Dibromochloromethane	90	70-130
1,2-Dibromoethane (EDB)	88	70-130
Chlorobenzene	87	70-130
Ethyl Benzene	93	70-130
m,p-Xylene	94	70-130
o-Xylene	92	70-130
Styrene	110	70-130
Bromoform	94	70-130
Cumene	94	70-130
1,1,2,2-Tetrachloroethane	89	70-130
Propylbenzene	100	70-130
4-Ethyltoluene	102	70-130
1,3,5-Trimethylbenzene	106	70-130
1,2,4-Trimethylbenzene	105	70-130
1,3-Dichlorobenzene	102	70-130
1,4-Dichlorobenzene	95	70-130
alpha-Chlorotoluene	179 Q	70-130
1,2-Dichlorobenzene	102	70-130
1,2,4-Trichlorobenzene	106	70-130
Hexachlorobutadiene	116	70-130
Naphthalene	65	60-140
TPH ref. to Gasoline (MW=100)	Not Spiked	

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	96	70-130
1,2-Dichloroethane-d4	97	70-130
4-Bromofluorobenzene	106	70-130



Air Toxics

Client Sample ID: LCSD

Lab ID#: 1412119A-12BB

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121804	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/18/14 12:17 PM

Compound	%Recovery	Method Limits
Freon 12	85	70-130
Freon 114	85	70-130
Chloromethane	79	70-130
Vinyl Chloride	81	70-130
1,3-Butadiene	84	70-130
Bromomethane	81	70-130
Chloroethane	86	70-130
Freon 11	85	70-130
Ethanol	96	70-130
Freon 113	89	70-130
1,1-Dichloroethene	86	70-130
Acetone	80	70-130
2-Propanol	98	70-130
Carbon Disulfide	83	70-130
3-Chloropropene	85	70-130
Methylene Chloride	79	70-130
Methyl tert-butyl ether	86	70-130
trans-1,2-Dichloroethene	80	70-130
Hexane	84	70-130
1,1-Dichloroethane	84	70-130
2-Butanone (Methyl Ethyl Ketone)	87	70-130
cis-1,2-Dichloroethene	86	70-130
Tetrahydrofuran	89	70-130
Chloroform	86	70-130
1,1,1-Trichloroethane	86	70-130
Cyclohexane	87	70-130
Carbon Tetrachloride	88	70-130
2,2,4-Trimethylpentane	86	70-130
Benzene	85	70-130
1,2-Dichloroethane	88	70-130
Heptane	88	70-130
Trichloroethene	89	70-130
1,2-Dichloropropane	86	70-130
1,4-Dioxane	100	70-130
Bromodichloromethane	88	70-130
cis-1,3-Dichloropropene	95	70-130
4-Methyl-2-pentanone	99	70-130
Toluene	82	70-130
trans-1,3-Dichloropropene	89	70-130
1,1,2-Trichloroethane	83	70-130
Tetrachloroethene	85	70-130
2-Hexanone	100	70-130

Client Sample ID: LCSD

Lab ID#: 1412119A-12BB

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	2121804	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/18/14 12:17 PM

Compound	%Recovery	Method Limits
Dibromochloromethane	88	70-130
1,2-Dibromoethane (EDB)	88	70-130
Chlorobenzene	85	70-130
Ethyl Benzene	93	70-130
m,p-Xylene	94	70-130
o-Xylene	93	70-130
Styrene	110	70-130
Bromoform	93	70-130
Cumene	93	70-130
1,1,2,2-Tetrachloroethane	87	70-130
Propylbenzene	98	70-130
4-Ethyltoluene	101	70-130
1,3,5-Trimethylbenzene	106	70-130
1,2,4-Trimethylbenzene	108	70-130
1,3-Dichlorobenzene	101	70-130
1,4-Dichlorobenzene	94	70-130
alpha-Chlorotoluene	178 Q	70-130
1,2-Dichlorobenzene	101	70-130
1,2,4-Trichlorobenzene	106	70-130
Hexachlorobutadiene	116	70-130
Naphthalene	63	60-140
TPH ref. to Gasoline (MW=100)	Not Spiked	

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	98	70-130
4-Bromofluorobenzene	105	70-130



Air Toxics

Sample Transportation Notice

Relinquishing signature on this document indicates that sample is being shipped in compliance with all applicable local, State, Federal, national, and international laws, regulations and ordinances of any kind. Air Toxics Limited assumes no liability with respect to the collection, handling or shipping of these samples. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Air Toxics Limited against any claim, demand, or action, of any kind, related to the collection, handling, or shipping of samples. D.O.T. Hotline (800) 467-4922

180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630-4719
(916) 985-1000 FAX (916) 985-1020

Page 1 of 1

Project Manager

Lynne Ferley

Collected by: (Print and Sign)

Brian Marwan

Company

Arcadis U.S., Inc.

Email Lynne.Ferley@arcadis-us.com

Address

111 SW Columbia Street Portland OR 97208

Phone

503-220-8201

Fax

503-220-8209

Project Info:

P.O. #

80046601, 008, 00260

Project #

354392

Project Name

TO-15, ASTM D1944

Turn Around Time:

☒ Normal

☐ Rush

Lab Use Only

Pressurized by:

Date:

Pressurization Gas:

specify

N₂ He

Lab I.D.

Field Sample I.D. (Location)

Can #

Date of Collection

Time of Collection

Analyses Requested

Canister Pressure/Vacuum

Initial

Final

Receipt

Final (psi)

01A

SSVP-1

34088

12/5/14

10:11

TO-15, ASTM D1944

-29

-5

02A

SSVP-2

37753

12/5/14

11:10

TO-15, ASTM D1944

-30

-5

03A

SSVP-3

121701

12/4/14

15:15

TO-15, ASTM D1944

-30

-5

04A

SSVP-4

121679

12/4/14

13:26

TO-15, ASTM D1944

-28

-5

05A

SSVP-5

13390

12/4/14

14:22

TO-15, ASTM D1944

-30

-5

06A

SSVP-6

121688

12/4/14

10:17

TO-15, ASTM D1944

-30

-5

07A

SSVP-7

121686

12/4/14

17:13

TO-15, ASTM D1944

-30

-5

08A

DUPLICATE

121621

12/5/14

11:43

TO-15, ASTM D1944

-29

-5

09A

EQUIPMENT BLANK

35593

12/5/14

11:43

TO-15, ASTM D1944

-30

-5

Relinquished by: (signature)

Date/Time

Received by: (signature)

Date/Time

Notes:

TO-15 for Full Suite VOCs and TPHs

Relinquished by: (signature)

Date/Time

Received by: (signature)

Date/Time

ASTM D1944 for O₂, CO₂, He, and CH₄

Relinquished by: (signature)

Date/Time

Received by: (signature)

Date/Time

COPY results to Brian Marwan@arcadis-us.com

Relinquished by: (signature)

Date/Time

Received by: (signature)

Date/Time

and Eric. Eggle@arcadis-us.com

Lab Use Only

Shipper Name

Air Bill #

Temp (°C)

Condition

Custody Seals Intact?

Work Order #

Use Only

Shipper Name

Air Bill #

Temp (°C)

Condition

Custody Seals Intact?

Work Order #

1412119

12/19/2014
Mr. Eric Epple
Arcadis U.S., Inc.
1100 Olive Way
Ste 800
Seattle WA 98101

Project Name: 354972
Project #: B0046601.0008.00260
Workorder #: 1412119B

Dear Mr. Eric Epple

The following report includes the data for the above referenced project for sample(s) received on 12/6/2014 at Air Toxics Ltd.

The data and associated QC analyzed by Modified ASTM D-1946 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Kelly Buettner
Project Manager

WORK ORDER #: 1412119B

Work Order Summary

CLIENT: PHONE: FAX: DATE RECEIVED: DATE COMPLETED:	Mr. Eric Epple Arcadis U.S., Inc. 1100 Olive Way Ste 800 Seattle, WA 98101 206-726-4755 206-325-8218 12/06/2014 12/19/2014	BILL TO: P.O. # PROJECT # CONTACT:	Accounts Payable Arcadis U.S., Inc. 630 Plaza Drive Suite 600 Highlands Ranch, CO 80129 B0046601.0008 B0046601.0008.00260 354972 Kelly Buettner
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<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>	<u>RECEIPT VAC./PRES.</u>	<u>FINAL PRESSURE</u>
01A	SSVP-1	Modified ASTM D-1946	4.9 "Hg	15.1 psi
02A	SSVP-2	Modified ASTM D-1946	5.3 "Hg	14.8 psi
03A	SSVP-3	Modified ASTM D-1946	3.5 "Hg	14.7 psi
04A	SSVP-4	Modified ASTM D-1946	5.9 "Hg	15 psi
05A	SSVP-5	Modified ASTM D-1946	3.5 "Hg	14.9 psi
06A	SSVP-6	Modified ASTM D-1946	3.1 "Hg	14.8 psi
07A	SSVP-7	Modified ASTM D-1946	3.7 "Hg	15.3 psi
08A	DUPLICATE	Modified ASTM D-1946	4.1 "Hg	15.4 psi
09A	EQUIPMENT BLANK	Modified ASTM D-1946	2.8 "Hg	14.9 psi
10A	Lab Blank	Modified ASTM D-1946	NA	NA
10B	Lab Blank	Modified ASTM D-1946	NA	NA
11A	LCS	Modified ASTM D-1946	NA	NA
11AA	LCSD	Modified ASTM D-1946	NA	NA

CERTIFIED BY:



Technical Director

DATE: 12/19/14

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
 TX NELAP - T104704343-14-7, UT NELAP CA009332014-5, VA NELAP - 460197, WA NELAP - C935
 Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
 Accreditation number: CA300005, Effective date: 10/18/2014, Expiration date: 10/17/2015.

Eurofins Air Toxics Inc., certifies that the test results contained in this report meet all requirements of the NELAC standards

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LABORATORY NARRATIVE
Modified ASTM D-1946
Arcadis U.S., Inc.
Workorder# 1412119B

Five 1 Liter Summa Canister (100% Certified) and four 1 Liter Silco Canister (100% Certified) samples were received on December 06, 2014. The laboratory performed analysis via Modified ASTM Method D-1946 for Methane and fixed gases in air using GC/FID or GC/TCD. The method involves direct injection of 1.0 mL of sample.

On the analytical column employed for this analysis, Oxygen coelutes with Argon. The corresponding peak is quantitated as Oxygen.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

<i>Requirement</i>	<i>ASTM D-1946</i>	<i>ATL Modifications</i>
Calibration	A single point calibration is performed using a reference standard closely matching the composition of the unknown.	A minimum of 5-point calibration curve is performed. Quantitation is based on average Response Factor.
Reference Standard	The composition of any reference standard must be known to within 0.01 mol % for any component.	The standards used by ATL are blended to a $\geq 95\%$ accuracy.
Sample Injection Volume	Components whose concentrations are in excess of 5 % should not be analyzed by using sample volumes greater than 0.5 mL.	The sample container is connected directly to a fixed volume sample loop of 1.0 mL on the GC. Linear range is defined by the calibration curve. Bags are loaded by vacuum.
Normalization	Normalize the mole percent values by multiplying each value by 100 and dividing by the sum of the original values. The sum of the original values should not differ from 100% by more than 1.0%.	Results are not normalized. The sum of the reported values can differ from 100% by as much as 15%, either due to analytical variability or an unusual sample matrix.
Precision	Precision requirements established at each concentration level.	Duplicates should agree within 25% RPD for detections $> 5 \times$ the RL.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:

B - Compound present in laboratory blank greater than reporting limit.

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the detection limit.

M - Reported value may be biased due to apparent matrix interferences.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

Summary of Detected Compounds

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

Client Sample ID: SSV-1

Lab ID#: 1412119B-01A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.24	16
Carbon Dioxide	0.024	2.8

Client Sample ID: SSV-2

Lab ID#: 1412119B-02A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.24	17
Carbon Dioxide	0.024	2.2

Client Sample ID: SSV-3

Lab ID#: 1412119B-03A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.23	13
Carbon Dioxide	0.023	4.9

Client Sample ID: SSV-4

Lab ID#: 1412119B-04A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.25	17
Carbon Dioxide	0.025	2.2

Client Sample ID: SSV-5

Lab ID#: 1412119B-05A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.23	14
Carbon Dioxide	0.023	5.7

Summary of Detected Compounds

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

Client Sample ID: SSVP-6

Lab ID#: 1412119B-06A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.22	15
Carbon Dioxide	0.022	3.2

Client Sample ID: SSVP-7

Lab ID#: 1412119B-07A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.23	20
Carbon Dioxide	0.023	0.15

Client Sample ID: DUPLICATE

Lab ID#: 1412119B-08A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.24	17
Carbon Dioxide	0.024	2.2

Client Sample ID: EQUIPMENT BLANK

Lab ID#: 1412119B-09A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.22	0.63

Client Sample ID: SSVP-1

Lab ID#: 1412119B-01A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9121207	Date of Collection: 12/5/14 10:11:00 AM
Dil. Factor:	2.42	Date of Analysis: 12/12/14 11:01 AM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.24	16
Methane	0.00024	Not Detected
Carbon Dioxide	0.024	2.8
Helium	0.12	Not Detected

Container Type: 1 Liter Summa Canister (100% Certified)

Client Sample ID: SSVP-2

Lab ID#: 1412119B-02A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9121208	Date of Collection: 12/5/14 11:10:00 AM
Dil. Factor:	2.44	Date of Analysis: 12/12/14 11:30 AM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.24	17
Methane	0.00024	Not Detected
Carbon Dioxide	0.024	2.2
Helium	0.12	Not Detected

Container Type: 1 Liter Summa Canister (100% Certified)

Client Sample ID: SSVP-3

Lab ID#: 1412119B-03A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9121209	Date of Collection: 12/4/14 3:15:00 PM
Dil. Factor:	2.26	Date of Analysis: 12/12/14 12:00 PM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.23	13
Methane	0.00023	Not Detected
Carbon Dioxide	0.023	4.9
Helium	0.11	Not Detected

Container Type: 1 Liter Silco Canister (100% Certified)



Air Toxics

Client Sample ID: SSVP-4

Lab ID#: 1412119B-04A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name: 9121210

Date of Collection: 12/4/14 1:26:00 PM

Dil. Factor: 2.52

Date of Analysis: 12/12/14 12:38 PM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.25	17
Methane	0.00025	Not Detected
Carbon Dioxide	0.025	2.2
Helium	0.13	Not Detected

Container Type: 1 Liter Silco Canister (100% Certified)



Air Toxics

Client Sample ID: SSVP-5

Lab ID#: 1412119B-05A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9121211	Date of Collection: 12/4/14 2:22:00 PM
Dil. Factor:	2.28	Date of Analysis: 12/12/14 01:02 PM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.23	14
Methane	0.00023	Not Detected
Carbon Dioxide	0.023	5.7
Helium	0.11	Not Detected

Container Type: 1 Liter Summa Canister (100% Certified)

Client Sample ID: SSVP-6

Lab ID#: 1412119B-06A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9121212	Date of Collection: 12/4/14 10:17:00 AM
Dil. Factor:	2.23	Date of Analysis: 12/12/14 02:12 PM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.22	15
Methane	0.00022	Not Detected
Carbon Dioxide	0.022	3.2
Helium	0.11	Not Detected

Container Type: 1 Liter Silco Canister (100% Certified)

Client Sample ID: SSVP-7

Lab ID#: 1412119B-07A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9121213	Date of Collection: 12/4/14 5:13:00 PM
Dil. Factor:	2.32	Date of Analysis: 12/12/14 02:51 PM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.23	20
Methane	0.00023	Not Detected
Carbon Dioxide	0.023	0.15
Helium	0.12	Not Detected

Container Type: 1 Liter Silco Canister (100% Certified)



Air Toxics

Client Sample ID: DUPLICATE

Lab ID#: 1412119B-08A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name: 9121214
Dil. Factor: 2.37

Date of Collection: NA
Date of Analysis: 12/12/14 03:19 PM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.24	17
Methane	0.00024	Not Detected
Carbon Dioxide	0.024	2.2
Helium	0.12	Not Detected

Container Type: 1 Liter Summa Canister (100% Certified)

Client Sample ID: EQUIPMENT BLANK

Lab ID#: 1412119B-09A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9121206	Date of Collection: 12/5/14 11:43:00 AM
Dil. Factor:	2.22	Date of Analysis: 12/12/14 10:14 AM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.22	0.63
Methane	0.00022	Not Detected
Carbon Dioxide	0.022	Not Detected
Helium	0.11	Not Detected

Container Type: 1 Liter Summa Canister (100% Certified)



Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1412119B-10A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name: 9121205
Dil. Factor: 1.00

Date of Collection: NA
Date of Analysis: 12/12/14 09:17 AM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.10	Not Detected
Methane	0.00010	Not Detected
Carbon Dioxide	0.010	Not Detected

Container Type: NA - Not Applicable

Client Sample ID: Lab Blank

Lab ID#: 1412119B-10B

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name: 9121204b
Dil. Factor: 1.00

Date of Collection: NA
Date of Analysis: 12/12/14 08:44 AM

Compound	Rpt. Limit (%)	Amount (%)
Helium	0.050	Not Detected

Container Type: NA - Not Applicable

Client Sample ID: LCS

Lab ID#: 1412119B-11A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9121202	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/12/14 07:26 AM

Compound	%Recovery	Method Limits
Oxygen	90	85-115
Methane	86	85-115
Carbon Dioxide	92	85-115
Helium	92	85-115

Container Type: NA - Not Applicable

Client Sample ID: LCSD

Lab ID#: 1412119B-11AA

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9121218	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/12/14 05:13 PM

Compound	%Recovery	Method Limits
Oxygen	90	85-115
Methane	88	85-115
Carbon Dioxide	93	85-115
Helium	92	85-115

Container Type: NA - Not Applicable



Air Toxics

Sample Transportation Notice

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Page 1 of 1Project Manager Lynne FenleyCollected by: (Print and Sign) Brian MarumCompany Arcadis U.S., Inc. Email Lynne.Fenley@arcadis-us.comAddress 111 SW Columbia St City Portland State OR Zip 97201Phone 503-220-8201 Fax 503-220-8209

Project Info:

P.O. #

Project # B0046601.0008.00260Project Name 354392

Turn Around Time:

☒ Normal☐ Rush

specify

Lab Use Only

Pressurized by:

Date:

Pressurization Gas:

N₂ He

Lab I.D.	Field Sample I.D. (Location)	Can #	Date of Collection	Time of Collection	Analyses Requested	Canister Pressure/Vacuum			
						Initial	Final	Receipt	Final (psi)
01A	SSVP-1	34088	12/5/14	10:11	TO-15, ASTM D1946	-29	-5		
02A	SSVP-2	37753	12/5/14	11:10		-30	-5		
03A	SSVP-3	141701	12/4/14	15:15		-30	-5		
04A	SSVP-4	141679	12/4/14	13:26		-28	-5		
05A	SSVP-5	13390	12/4/14	14:22		-30	-5		
06A	SSVP-6	141688	12/4/14	10:17		-30	-5		
07A	SSVP-7	141686	12/4/14	17:13		-30	-5		
08A	DUPLICATE	141621	-	-		-29	-5		
09A	EQUIPMENT BLANK	35593	12/5/14	11:43		-30	-5		

Relinquished by: (signature) Date/Time

Brian Marum 12/5/14 16:00

Received by: (signature) Date/Time

Eric Apple 12/6/14 11:30

Relinquished by: (signature) Date/Time

Received by: (signature) Date/Time

Relinquished by: (signature) Date/Time

Received by: (signature) Date/Time

Notes:

TO-15 for Full Suite VOCs and TPHs
ASTM D1946 for O₂, CO₂, He, and CH₄
Copy results to Brian Marum@arcadis-us.com
and Eric Apple@arcadis-us.com

Lab Use Only	Shipper Name	Air Bill #	Temp (°C)	Condition	Custody Seals Intact?	Work Order #
	<u>ELIX</u>		<u>NA</u>	<u>Good</u>	Yes No <u>None</u>	<u>1412119</u>